# THE SUBMARINE REVIEW JULY 1994

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# EDITOR'S COMMENTS

E ach of the <u>Features</u> at the front of this edition of THE SUBMARINE REVIEW treat issues which are most worthy of note and thoughtful consideration. President Clinton's congratulations on the success of naval nuclear power has connotations beyond the recognition of a significant milestone—it says a lot more about the future than the past. Secretary Dalton's ringing speech at the June 16th Symposium banquet solidly endorsed the submarine building program. A collection of appropriate parts of several of SecNav's speeches is also included as background, and as an indication of his support of submarines.

In his remarks to the Symposium, the Chairman of the Naval Submarine League, Admiral Carl Trost, surveyed the current environment facing the submarine community, and laid out the general plans of the League in meeting its challenge. Vice Admiral George Emery's keynote talk to the Technology Symposium in May has been declassified and is also featured here to present SubLant's views on the importance of technological advances to future submarine performance. Other presentations at both the Technology and the Annual Symposia will be presented in the October issue of THE SUBMARINE REVIEW, but the final feature selected for inclusion here is the talk given by Rear Admiral Bill Houley on the need for innovation and pulling together in the submarine community if we are to be successful in the uphill battle ahead of us.

To set the context for consideration of a major part of the submarine building picture, the first of the Articles is a piece which recaps the history and the purpose of the New Attack Submarine program from the time it was known as the CENTURI-ON project. The next one is more general in scope but it addresses a concern of us all in its treatment of budget-based cuts versus those based on an objective assessment of requirements.

For a change of pace, and venue, we have three articles on the Soviet Submarine Force. One aspect of their performance in World War II is treated by the noted German naval historian Professor Doctor Jürgen Rohwer as he describes the action by the Soviet boats in the eastern Baltic during the last year of the war. He notes that several sinkings at that time resulted in history's worst sea disasters. Another article recounts the early days of Russian submarining and the design, building and operation of their first submarine. The third story is a more modern one and serves to prove that simple mistakes can add up to big problems in anyone's navy.

A pair of articles about U.S. submarines is offered, with a new career for REQUIN described and an old trip for POGY recounted. For those who marveled at the high-tech graphics presented by the CO of the Submarine School at the Annual Symposium, the last article should be of particular interest. The Lieutenant Commander responsible for the computer-driven graphics describes his day-job use of those talents for modern training. It seems that School-of-the-Boat is not what it used to be.

One of the special notices in this issue concerns the project of the Capital Chapter to provide job counseling for those leaving the service or transitioning for one reason or another. The other notice is a status update on the Submarine Bibliography project. Finally, it is with great pleasure that the **REVIEW** presents a condensation of Commander Red Ramage's patrol report of the action that won him the Medal of Honor 50 years ago this summer.

Jim Hay

## FROM THE PRESIDENT

s this volume of THE SUBMARINE REVIEW goes to press, we wrap up a very busy and exciting quarter. In May, the Submarine Technology Symposium at Johns Hopkins University Applied Physics Laboratory was once again a sellout success. The theme, "Shaping the Submarine Force for the Twenty-First Century: Enabling Technologies for Transition from the Sea to the Littoral", evoked a number of interesting papers. Advanced weapons (torpedoes, cruise missiles, and mines), enhanced high data rate communications, new concepts in stealth, new hydrodynamics applications, underwater vehicles, precision navigation, submarine-launched unmanned aerial vehicles, nextgeneration sensors, and mine counter-measures are representative of the subjects presented. Guest speakers included Vice Admiral George Emery, USN, COMSUBLANT; Rear Admiral Marc Pelaez, USN, Chief of Naval Research; Rear Admiral David Oliver, USN, Deputy for Policy to the Assistant Secretary of the Navy (Research, Development and Acquisition); Dr. Louis Marquet, Assistant Deputy Under Secretary of Defense for Advanced Technology Development; and the Honorable Noel Longuemare, Principal Deputy Under Secretary of Defense for Acquisition and Technology. Planning for the 1995 Technology Symposium is already underway.

Without much of a recovery period, the Annual June Submarine Symposium was upon us, and again we were blessed with success. The attendees heard reports from the Force Leadership, Atlantic, Pacific and Washington; a wake-up call from our compatriot Richard Compton-Hall of the U.K.; after-action reports from Commander Tom O'Connor, CO, USS SCRANTON (SSN 756) and Commander Bill Ostendorff, CO USS NORFOLK (SSN 714) recently returned from Adriatic deployments; John Birkler of the RAND Corporation, author of the Submarine Industrial Base Study: Rear Admirals John Mitchell on Strategic Systems, Bob Natter on Legislative Affairs, Walt Cantrell on Navy C<sup>9</sup>I, Dugan Shipway on the New Attack Submarine, and Bill Houley on Technology Requirements. Captain Wayne Peters described the transition at Submarine School from our beloved MK 4 TDC to the Star Trek systems of tomorrow, while Captain Robert Crawshaw, a surface warrior, described the new world of Maritime Action Group operations in the which SSNs play such a vital role, and Admiral Hank Chiles, CINC STRATCOM, revealed the complexity of the ongoing strategic force considerations. The Honorable Ike Skelton, U.S. Representative from Missouri and a great friend of the Force, was our luncheon speaker, while Secretary of the Navy John Dalton, a submariner, was our guest of honor at the banquet. Despite the very full agenda, there was time for socializing, renewing old friendships, and an occasional sea story.

One other event of the quarter was of historical significance. An industrial team (GTE, Lockheed Sanders, and General Dynamics Electric Boat) executed successfully on board USS ALBANY (SSN 753) a submarine communications demonstration in which submarine periscope video, imagery, video teleconferencing, high throughput data, encrypted telephone calls, and E-mail messages were transferred to and from the ship at periscope depth in real time, with zero error rates. Any doubts concerning the viability of submarines as active participants in the Joint Task Force should be erased. The last piece of good news as we go to press is that as a result of an aggressive recruiting campaign, we have gained eight new Corporate Benefactors. If we were as successful in individual memberships...

This volume of THE SUBMARINE REVIEW attempts to bring you up-to-date on the many and complex fast-moving acquisition issues. Pay attention. There will be a quiz.

**Bud Kauderer** 

# MARK YOUR CALENDARS!!

 1995 Submarine Technology Symposium: May 9-11, 1995 at Johns Hopkins Applied Physics Laboratory, Laurel, Maryland

 13th Annual NSL Symposium: June 6 & 7, 1995 at Radisson Plaza Hotel, Alexandria, Virginia

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# 100,000,000 MILES ON NUCLEAR POWER

THE WHITE HOUSE

April 25, 1594

The Honorable William J. Perry Secretary of Defense Washington, D.C. 20301

Dear Blishn

This month our Havy reaches a historic milastone -- 100 million miles atseved on nuclear power.

From the time the OSS HADTILOS first want to see nearly 40 years ago, our nuclear-powered fleat has grown to 121 ships, including submarines, cruisers, and aircraft carriers. Buciear propulsion has enabled these ships to make a vital and continuing contribution to our national interest -- gravity enhancing strategic deterrence, maintaining freedom of the seas, and providing an efficient means to address regional crises.

This ellestone is remarkable because it has been reached safely and in a way that has protected the public and the environment, both here and abroad. The Naval Muclear Propulsion Program, with its high standards and efficiency, exemplifies the level of excellence we are working toward throughout our government.

I commend you and your Department for this great accomplishment. I know that this schievement could not have been possible if it were not for the hard work of thousands of committed people -- military and civilian -- both in industry and in government. They represent a remarkable blend of the best of our mation's talent and resolve, and I ask that you convey to them my personal congratulations for their contribution to this milestone.

Sincerely."

Aucunter



NAVAL REACTORS

April 29, 1994

#### TO ALL PROGRAM PERSONNEL

The nuclear powered fleet has reached the impressive milestons of steaming 100,000,000 miles. In recognition of this accomplishment, I am pleased to provide the attached letter from the President of the United States. Given the joint nature of our program, an identical letter was sent to the Secretary of Defense and the Secretary of Energy.

The effort to develop and deploy nuclear propulsion is one of this cantury's great achievements in engineering. Admiral Rickover transformed a potential technology into reality, revolutionizing submarine warfare and providing ships that perform sultiple missions unsupported and without the constraint of fuel replanishment. As time has shown, of equal importance is the implementation of high standards and technical discipline -- and attracting high quality people -- so that the use of nuclear propulsion is safe and protects the environment.

We face a dramatically changing world that leads to a reduced number of ships and support activities. It does not mean, however, any less of a critical role for nuclear power in the future flest. In dealing with downsizing issues, I am mindful of the extraordinary commitment and professionalism of the people susociated with this work.

To each individual who is a part of the Program, you have the Nation's and my sincere appreciation for your contributions. You are a part of an anterprise that few, if any, can equal and one that has met the hardest test of all, sustained excellence over the long haul. In adjusting to future change, we will do so without compromising our standards or our performance. Your commitment and hard work remain essential to carrying the record forward.

Stellan

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B. DeMars Director, Naval Nuclear Propulsion

Attachment

#### A SUBMARINE FORCE "... FROM THE SEA"

Remarks as delivered by The Honorable John H. Dalton Secretary of the Navy at the NSL Symposium Banquet 16 June 1994

Lot of invitations. But I think the opportunity to address this group of distinguished submariners is one of the greatest pleasures, because it reminds me of my roots within the naval community.

Roots are always the strongest when they grow deep below the surface—and that is true of my experience as a Division Officer aboard submarines. I know that what I have accomplished in my life has been shaped by the leadership experience I gained as an officer in our Submarine Force, and I will always be grateful for that opportunity.

As important as the education and inspiration I received at the Naval Academy have been on my outlook on life, the experiences I had in learning to lead sailors in BLUEBACK and JOHN C. CALHOUN were even more important in my understanding of people—an understanding critical to success.

Although both BLUEBACK and JOHN C. CALHOUN are decommissioned now, the spirit of those boats still remains in the hearts of the officers and sailors who served aboard them. It is a valiant spirit—the spirit of courage common to the entire submarine community.

I keep a number of submarine mementoes in my office, not so much as to remind myself of this spirit, but to announce it proudly to everyone who visits me. Among these symbols are pictures of BLUEBACK and metal and wood from the fridge and battery compartment of JOHN C. CALHOUN. They indeed represent the fact that though those boats are deactivated, the spirit remains active and alive.

During my efforts at convincing individual Congressmen to support SSN 23-an effort that necessitates a lot of very long phone calls, I've had a lot of opportunity to gaze at these relics-and I've decided when SSN 23 is constructed, I'd like to put some pieces of our decommissioned subs-the boats that won the Cold War-aboard to remind new submariners of their heritage. You noticed that I said when SSN 23 is constructed, not if. I am very committed to the preservation of the submarine industrial base for more than sentimental reasons. Our submarine industrial is a nation treasure. As I told members of Congress at a breakfast held this morning, today's nuclear submarines are not overnight products. The companies involved in nuclear submarine construction developed today's technical base through steady evolutionary progress beginning in 1946-48 years of evolution.

To allow this investment to dissolve, to starve, to dissipate is to throw away a national resource that simply cannot be recreated when a crisis arrives.

I am not going to allow the abandonment of this investment because of false economy. Even as I work with Defense Secretary Perry and Deputy Secretary Deutch to finalize the requirements for the New Attack Submarine and ensure its affordability, I intend to ensure the Congress is reminded that affordability requires, as a prerequisite, the capability to produce. Squandering that capability is not the way to affordability. Like the commercial says, you can pay some money now or a lot of money later.

I think one of the most important roles I have as Secretary of the Navy is to remind Congress about the nature of this investment—and how it has paid off time and again for our national security. It is imperative that we continue to state the case for maintaining a modern, capable Submarine Force. Obviously, I rely on and greatly appreciate your efforts as members of the Naval Submarine League in helping me get the public message across.

One of the ironies of our efforts to make the case for a balanced, flexible Submarine Force is that many who have accepted the industrial base argument seemed to have forgotten about the role of the submarine and its continuing importance in the post-Cold War world. Critics have gone as far as to claim that nuclear attack submarines are Cold War relics and are not vital to New World requirements. That charge is complete and utter nonsense.

The SEAWOLF Class is being built to preserve the nuclear submarine industrial base, but it also adds considerable strategic value to a recapitalized Submarine Force. Both the submarine's capabilities and the industrial base are critical reasons for acquiring the SEAWOLFs, including SSN 23, and both are my major considerations. What is the role of the submarine in a world of regional threats? Let me tell you one scenario that I've thought about.

A regional power ruled by a military dictatorship embarks on the conquest of territory belonging to another nation. The aggressor—possessing capable naval, air, and land forces by regional standards—mobilizes to consolidate its gains and refuses the entreaties of the world community to peacefully withdraw. A global power decides to intervene and sorties its forces. First to arrive on the scene—or perhaps they were already present—are the global power's nuclear powered submarines. A submarine torpedoes and sinks one of the aggressor's major surface combatants. As the result of this action, the aggressor surface fleet does not make a single sortie for the rest of the war. Over one-third of its effective military force has been neutralized, and through joint operations its forces are eventually dislodged.

This is not a fantasy, it is an actual occurrence. After the British nuclear attack submarine HMS CONQUEROR sank the GENERAL BELGRANO, Argentina's naval surface force never made another sortie and the Argentinean ground forces in the Falklands were cut off from resupply by sea. Today the Falkland Islanders still have the government they prefer, and Argentina has a democratic government.

Future crises may not be exactly like this scenario, but the role of the submarine in hastening their resolution is quite evident. When we look at the potential regional threats of today, I am convinced that a capable Submarine Force is necessary for victory in regional conflicts—a capability that, in itself, is a considerable deterrent.

And I am convinced that a balanced, capable Submarine Force would include 688 Class, SEAWOLF, and New Attack Submarines. The 688 Class represents our current multi-purpose capabilities. SEAWOLF represents a level of quieting that would be critical if we were to once again face an ocean-going naval threat. Constructing three SEAWOLFs is a prudent strategic hedge against that possibility, as well as being a key bridge strategy for preserving our submarine industrial base. And the New Attack Submarine will be the affordable alternative that is optimized for near-shore, littoral warfare and special operations. Like the overall Navy program, this is prudent defense in depth.

To maintain such a force, we need to build an average of 1.5 boats per year. If we do not construct SSN 23 there will be a seven years gap between the start of SSN 22 and the start of the New Attack Submarine in 1998. I don't think that the industrial base can survive that gap. Nor might our strategy.

So as you can see, I think there is considerable justification for a submarine program that balances the flexibility needed for new world requirements, such as capabilities for special warfare, countermine warfare, and near-shore ASW, with the requirements needed to respond to a resurgent open-ocean threat. Although we have great hopes for the future of democracy in Russia, the Russian Navy has continued to build an extremely quiet fourth generation of nuclear submarines.

Mastering the littorals ...,from the sea requires capabilities different than those required by a global conflict— but, like before, there is no single formula, no one solution. Putting all eggs in one basket is neither sound financial planning nor sound national security planning. As Secretary of the Navy, I am responsible for ensuring that we maintain a prudent hedge towards future potentials.

Thinking about the future ...from the sea is a continuous requirement for the entire Department. While embracing the concept outlined in ...From the Sea, and applauding the direction that it has taken the post-Cold War naval service, we must recognize the continued need for a formal strategy to support these concepts—a strategy that addresses the changes in the world, and reflects the technological advances taking place today. We must be vibrant and innovative in crafting a strategy that provides for the Navy after next.

That is why, in this past week, I directed the CNO and the Commandant, in consonance with the Undersecretary, to begin work on the framework for expanding <u>...From the Sea</u> into a new maritime strategy. This framework will provide the strategic bridge between our doctrine for warfighting and the objectives of our peacetime operations. It will examine the relationship between forward presence and crisis prevention, and detail the transition of naval forces across the entire spectrum of conflict, from peacetime presence to crisis response operations. I anticipate the completion of this revised maritime strategy by early next year. One of the goals of this strategic framework is to more fully discuss the role of our Submarine Force in littoral operations and forward presence.

... From the Sea is our foundation. I see it as a starting point

for what lies beyond. The Navy and Marine Corps leadership need to tell the rest of the story, including the importance of our Submarine Force.

Reminding all Americans of the epic history of our Submarine Force is just as important. And I know that is something the Naval Submarine League does very well. History is the only real laboratory for international politics, the source of our understanding on the importance of national defense. That is why I have come to view the incorporation of the mementoes of this past with out new construction as so symbolic.

Recently I had the opportunity to dedicate BLUEBACK as a permanent display at the Oregon Museum of Science and Industry in Portland. As I spoke to an audience that included submarine veterans—many of whom were silently destroying the commerce of Imperial Japan while the nation's eyes were fixed on the heroic landings on Normandy half a world away—I recognized how important it is for us to let the younger generation know of the courage of the *Slient Service*.

We assume that they realize the critical contribution that our Submarine Force made in winning World War II, and that they remember how operations similar to those described in <u>The Hunt</u> for <u>Red October</u> helped to end the Cold War. But memory has a short half-life if we don't remind others. And it is tough for our young people to envision a history that is receding and that they did not experience.

I am concerned about this because I am concerned about retaining a quality naval service in the face of a public perception that, in our era of right-sizing, the Navy is no longer hiring. Our Navy today is made up of the highest quality people in the history of our service. We need to continue this legacy by recruiting over 56,000 quality sailors this year, next year and the year after that. In this number will be the future of our Submarine Force, and I rely on everyone in this room to get the word out that there is room in the Navy and the Submarine Force for our young people to continue the heritage of courage and service forged in war and peace by their fathers and grandfathers. Many people have the mistaken impression that a naval career is a thing of the past. Nothing can be further from the truth.

Although our future Submarine Force may have roles and missions different than the past, the gold and silver dolphins will mark sailors who are a breed apart-those who sail with courage short half-life if we don't remind others. And it is tough for our young people to envision a history that is receding and that they did not experience.

I am concerned about this because I am concerned about retaining a quality naval service in the face of a public perception that, in our era of right-sizing, the Navy is no longer hiring. Our Navy today is made up of the highest quality people in the history of our service. We need to continue this legacy by recruiting over 56,000 quality sailors this year, next year and the year after that. In this number will be the future of our Submarine Force, and I rely on everyone in this room to get the word out that there is room in the Navy and the Submarine Force for our young people to continue the heritage of courage and service forged in war and peace by their fathers and grandfathers. Many people have the mistaken impression that a naval career is a thing of the past. Nothing can be further from the truth.

Although our future Submarine Force may have roles and missions different than the past, the gold and silver dolphins will mark sailors who are a breed apart—those who sail with courage beneath the distant seas. We will continue to build the most capable submarines in the world and crew them with the most capable sailors. As Secretary, I can assure you that fact is one thing that will not change.

Thank you for your efforts in support of our Submarine Force and the naval service. Margaret and I have enjoyed your wonderful banquet. God bless you. God bless the Unites States Navy and our heroic Submarine Force. And God bless America.

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# SECRETARY OF THE NAVY JOHN H. DALTON ON SUBMARINES

[Ed. Note: The Honorable John H. Dalton, seventieth Secretary of the Navy, was a submariner during his active duty naval career, serving in BLUEBACK (SS 581) and JOHN C. CALHOUN (SSBN 630). Prior to deactivation of JOHN C. CALHOUN, Secretary Dalton paid a last visit aboard. It was the first time on record that a Secretary of the Navy's flag flew over a ship in which he had served as a junior officer. Secretary Dalton's experience in submarines has played an important role in his decisions as Secretary. The following quotes by Secretary Dalton about submarines and submariners have been compiled from his speeches and public remarks.]

# On the current and future role of submarines

Our Submarine Force remains our trump card in retaining command of the seas—an absolute necessity for the defense of our maritime nation and the bedrock prerequisite for being able to carry out our ...From the Sea strategy. Our Submarine Force is critical in ensuring that no other nation can challenge us at sea. And indeed, our submarines can perform missions in support of all future operations that are only limited by imagination.

[28 August 1993]

The role of the submarine has long been closely linked to combatting the Soviet threat. But this role has changed and will continue to change in order to bring our new concepts into operation.

I view the role of submarines in our ... From the Sea vision as both elements of, and prerequisites for, the strategy. What I mean by prerequisite is that without a modern, capable Submarine Force we cannot even start the power projection mission as envisioned. The first prerequisite is, of course strategic deterrence. SSBNs will have the prime role in this joint mission. The second prerequisite is command of the sea. Our attack subs play the major role. [22 September 1993]

## On submarines in the Cold War victory

I feel the pride in what the officers and crew of the Submarine

Force, both ballistic missile and attack boats, have accomplished for almost 40 years: the deterrence of nuclear and global war. In this they have achieved the greatest of victories. When the Cold War was at its height, our subs were always on the front lines—training, preparing, gathering information and deterring. that was our policy and it succeeded.

[28 August 1993]

The role of subs throughout the Cold War was recognized by Chairman Powell at a ceremony in Kings Bay, Georgia for the 3000th SSBN patrol. He said: "No one-No one has done more to prevent conflict-no one made a greater sacrifice for the cause of peace-than you, America's proud submarine family. You stand tall among all our heroes of the Cold War."

[ 22 September 1993]

#### On the submarine industrial base

The submarine, the most revolutionary naval weapon developed and perfected in this century was not developed by the Navy. It was developed by private industry. It was perfected by a cooperative, productive partnership between the Navy and private industry.

As a former submariner and private businessman now in government, I really like the image of this partnership. And I know this partnership is vital for the health of the Navy.

[22 September 1993]

My personal concern is in preserving the vital core defense industry capabilities that cannot be *converted* and that we cannot afford to reconstruct if they are allowed to disintegrate. Our ability to build nuclear submarines and aircraft carriers must be preserved...

The goal is to stabilize the defense industry and preserve the capabilities that simply cannot be produced by the commercial marketplace. In that sense, funding for CVN 76 and follow-on carriers and the New Attack Submarine represent prudent investments in America's vital resources.

[14 March 1994]

The submarine industrial base is a national resource and today's nuclear submarines are not overnight products... The companies involved in nuclear submarine construction developed today's technical base through steady evolutionary progress...48 years of evolution.

This has been an enormous national investment that required ongoing training and upgrade of the necessary skills. To allow it to dissolve, to starve, to dissipate is to throw away a national resource that simply cannot be recreated when a crisis arrives.

[16 June 1994]

## **On SEAWOLF**

The SEAWOLF Class is being built because it will add considerable strategic value to a recapitalized Submarine Force. Both the submarine's capabilities and the need to preserve the industrial base are critical reasons for acquiring the SEAWOLFs, including SSN 23, and both are my major considerations.

[22 September 1993]

# On the New Attack Submarines

My challenge...is to articulate the specific joint missions that submarines can optimally perform to accomplish the "...From the Sea presence and power projection missions. Such roles as intelligence and warning, strike, interdiction, local sea control, and dealing with the mine and diesel sub threats are what we are looking at for the New Attack Submarine program.

[22 September 1993]

I am working closely with Secretary Perry and Deputy Secretary Deutch in order to finalize the specifics for the New Attack Submarine. We are focussing on developing a submarine that is optimized for littoral missions, but still has the level of quieting and overall versatility necessary for open-ocean missions. [16 June 1994]

#### On informing the public about submarine capabilities

It is important for us to articulate how submarines are critical to our new emphasis on power projection from the sea. We need to continue to refine our public message concerning the unique joint capabilities submarines bring to the unified commander even when there are no enemy fleets to fight. You and I know the reasons, but the big attention getter is the overall cost of submarine construction. We need to educate the public on those joint capabilities and drive down the costs if we want a balanced sub force. [22 September 1993]

## On the sacrifices of submariners and their families

...We should pause to remember and take pride in the patrols, the preparations, the personal sacrifices, and the separations from loved ones that were required to preserve the peace. We should even remember the arduous safety inspections, which were critical and highly successful in ensuring the safety of our environment.

The freedom of Americans and our friends and allies was safeguarded by the actions of these sailors thousand of miles from their homes. They stood watch, not for themselves, but for their loved ones, friends and neighbors in cities across America...

[28 August 1993]

They were American submariners...a breed apart, even within their own service. Their legacy was the courage of the brave men who went down in the first American submarines when others doubted they would come up. [14 May 1994]

As always, the future of the Submarine Force will be different than the past. But as always, the gold and silver dolphins will mark sailors who are a breed apart—those who sail with courage beneath the distant seas. We will continue to build the most capable submarines in the world and crew them with the most capable sailors. That will not change.

[9 April/16 June 1994]

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#### REMARKS TO THE ANNUAL NSL SYMPOSIUM by ADM C.A.H. Trost, USN(Ret.)

Chairman, Naval Submarine League 16 June 1994

e live today as a super power and some would rightly say, the world's only super power. We have economic strength, political stability and military capability. The former Soviet Union was a super power-it certainly had the military might and it had enforced military stability but it had a declining economy which led to its collapse as a union and to its fragmentation into a series of states. Its economy has not gotten any better-its political stability is still at risk-its military capability is considerable. Which leads one to think that we as a nation, as a superpower, have the role of being the world's policeman because there are no others. With the role of being, or having been, the world's major political leader because of our capabilities, we might wonder whether we are going to retain that capability. I say that because our economy is strong; political stability in this country in the current era is a given. Our military capability is very considerable.

Where are we going? In my view we are and continue to cut military capability in the country too rapidly and too deeply. I'm not just talking about the Submarine Force. I'm not talking about the validity of a decreasing threat. I am talking about a very, very unstable world which isn't getting any better. I'm talking about U.S. national interest including the ability to have free access to the seas to maintain a strong economy which is vital to this country's future.

Our ability to project influence, our ability to protect our own economic interest, our ability to interface with the world community, our ability to continue to be a superpower—a winner; is at risk in my judgement. Why do I say that? I've said we've cut too far too fast. I really believe that. I listen to statements that say military readiness is our key objective. But facts don't bear that out. Military readiness is two things. It's a readiness of its platform and its people to do the job and it's adequate numbers of platforms to do the job at a risk that is acceptable to the country.

We're in a country that's no risk. Every time something happens, even if we personally screw it up, we want to sue somebody and solve the problem. We found that during Desert Shield/Desert Storm Operation just 4 years ago that we have a country that is totally averse to the thought of losing any military personnel in a combat operation. Fortunately the casualties were low and there wasn't a great outcry.

We also have shown a political propensity to want to get involved in military activity in various parts of the world. And right now we probably still have the capability to do so. What about the future? What about the readiness? We are throwing away, and I use the term knowingly, a lot of talented people who represent a tremendous investment of time, effort, and money over the last decade. They are not gone from our society, but they are productive people gone from the military with the resultant detrimental impact of morale of those who remain. We are getting rid of very good ships. We are decommissioning submarines rather than refueling them, accepting the fact that we will have them for only half of their initially designed life. We are saving money now but what about the future?

We are trying to understand what it means to have the necessary industrial capacity to support our needs. We say readiness is priority number one. OK, we're getting rid of the people but we have enough left to man the ships because we are getting rid of ships at an even faster rate. But when I talk to people about readiness they say that we are underfunded.

Now you're always underfunded somewhat if you are the athome Fleet Commander supporting the deployed units operating at a higher op tempo. But we are underfunded for other reasons. We are underfunded because the Navy gave up several hundred million dollars out of its base closure set-aside to rebuild earthquake-ravaged portions of California. Certainly a worthy endeavor; but out of the Navy budget not in my view.

We have a base realignment and closure procedure which is being challenged at every turn because nobody wants to lose facilities. And yet the military is forced to sustain and support the facilities that are in excess of requirement and that money comes out of the readiness hide. It's operations and maintenance funding that comes out of the hide of the Fleet Commander who has to maintain that fleet. And when he also has additional bases that he has to pay for that's another drain on his dollars. So are we really supporting readiness in this country. I don't think so.

I think as Richard Compton-Hall said yesterday this country is in great need of a history lesson. Maybe a rather indepth history seminar. We seem to forget that every time we get weaker something happens that we don't like. And then we pay a very high price to recover and to get back to where we want to be. Do you think that the North Koreans, for example, aren't aware of the decline of our military capability. I think they are fully aware of it. I think it plays right into their hands. Those who we bluff say "Can they carry it out?" Maybe they can but they don't seem to follow up on their comments. They might say let's look to the future because we see a decline and we see that things are going down and all we have to do is wait our time. After, all most people in the world have far greater patience than the people in this country, especially our national leaders. I think perhaps it is time to have some emphasis on lessons of the past to recognize that the threat we are preparing for is not necessarily that conventional threat that we've been so accustomed to but the threat of capabilities which could be used against us should there become obvious a hostile political attempt.

So I guess it's time to get smart, and what that says to me for the Submarine League and its constituents, both corporate and individual members, is that we have to be part of this effort to be prepared to speak out, to influence those in positions of leadership to recognize that we do need a strong military. We need a strong viable Submarine Force. We need the industrial capability to sustain it. We also need aircraft carriers and airplanes. The Navy is not producing or developing a single new model aircraft today. We need surface combatants; we need some amount of amphibious lift. Above all, from the Navy's perspective, we need to be able to influence what happens at sea when we want it to happen. We can't do that if we become a second rate Navy. The country needs a strong military across the board with a balance that's determined by the likely employment of that military. That balance could be interpreted in many different ways depending on whether you support a stronger Navy, Army or Air Force; I know that. But there is a right and logical answer that could be derived by people who look carefully at where we're headed.

My purpose in all this is to say that we in the submarine community have to continue to be active. We, you out there, have been staunch supporters of the need for a strong Submarine Force and the need for a strong military and we have to continue that effort if we are to do our job as members of this League. If we are to do our job, those of us who have been associated with the military, in ensuring that what we have learned is passed on to those who now have the responsibility to ensure a viable United States as we now know it.

# REMARKS TO THE 1994 SUBMARINE TECHNOLOGY SYMPOSIUM

by VADM George W. Emery, USN Commander, Submarine Force U.S. Atlantic Fleet May 10, 1994

There are two things that give our submarines a qualitative advantage over those of other nations—our people, and our advanced technology. The people part of the equation is the responsibility of the Navy blue-suiters on active duty—to recruit, train and pass on the legacy of our predecessors to our future leaders. But the second key area, technology, is the province of you in this audience. Your expertise is critical to maintaining our world preeminence in undersea warfare. We need your help to improve our capabilities as the Navy transitions from the concepts of war on and under the high seas toward support of battle on land, concentrating on littoral warfare and maneuver "from the sea".

In many cases, we need to field equipment and get it to the fleet as soon as possible, such as an operational unmanned underwater vehicle (UUV). My goal is for us to work as a team to pull it all together—science and engineering, with leaders from industry, academia, and government. In order for us to work efficiently and to the maximum benefit of the Navy and the Submarine Force, we all need to share a common vision and work toward common goals. To that end, I'd like to share my thoughts with you as both an operational commander, and as the submarine community sponsor.

Let's project ahead 10 years from now. What will the world look like, and what will our Navy and submarines face in opposition? Predicting the future may be inexact, but we must try if we are to provide our nation with the tools we believe we need to protect our vital interests and economic well-being over a wide range of possibilities. World-wide trends point toward continued regional instability driven by the pressures of economic hardship, mass migrations and ideological differences. There will be many more situations such as we have today in Bosnia, Somalia, Rwanda and Haiti; there is danger of major regional conflicts in the Persian Gulf and the Korean peninsula; and a resurgent Russia could emerge at odds with the West if democratic reforms fail. High technology weapons will be readily available throughout the word to anyone with the cash to pay for them. High performance supersonic anti-ship cruise missiles and sophisticated anti-air defenses will present formidable challenges to our surface and air forces. Nuclear weapons will be reduced within the United States and Russia, but may proliferate elsewhere. On the domestic side, our government and the American public will demand we minimize the risk to American military personnel in any potential conflict.

In order to deal effectively with an unstable world and protect our vital interests, it's important that we maintain a strong Navy and Submarine Force able to deal decisively with any potential adversary. In particular, we will face more modern submarines around the world as undersea technology proliferates. The 688/688I submarines that make up the bulk of our force today are relatively new, with an average age of 9 years. But, by 1005, the average age of our SSNs will be 16 years. Note that during a 9 year period between 1997 and 2005, assuming a third SEA-WOLF is authorized in FY 96 and the first New SSN is authorized in FY 98, only 3 new submarine will be delivered. By 2005, our attack submarine force will consist of about 50 SSNs 4 modern submarines (3 SEAWOLFs and 1 New SSN) and 46 688/688Is. If the third SEAWOLF is cancelled, and the New SSN delayed, we will have only 2 modern post-688 SSNs. Although the 688s and 688Is are fine submarines today, it's clear that they are vulnerable to the projected threat, have no room for further major modifications, and need improvement in littoral warfare capabilities. They will be retired at a rate of 3 to 4 per year early next century. The bottom line is that an infusion of new technology is urgently required for the next generation SSN, an SSN which must not only serve us better in regional conflict but be able to also deal with the best competition it is likely to meet on the high seas. We also need to backfit new technology where we can to enhance the large numbers of 688s and 688Is in littoral warfare and rest-of-the-world missions since they will make up the bulk of our force well into the next century.

So, looking into my crystal ball, I'd like to make some observations on where we're headed, what's important to us, and where we need help in the technology areas. I'll try not to steal anyone's thunder from the presentations you will hear during this symposium, but rather provide a thumbnail sketch to set the stage for those who follow.  First, we need steady production of new SSNs. There are three main reasons why this is true.

(1) First, the threat of quieter, more modern submarines by potential adversaries. Our best submarines today will have an unacceptably low advantage compared to the submarines possessed by other countries by the next decade.

(2) Secondly, it's the best way to preserve our critical industrial base of over 5000 vendors and the unique skills of our designers and builders.

(3) Finally, we must build now because of the impending high rate of 688 retirements later. It's unlikely that we'll be able to afford to build enough submarines to match the 3-4 per year retirement rate of 688s.

 A production bridge is required until construction of the New SSN begins. Building the third SEAWOLF is the most cost effective way to go. Unfortunately, a lot of people on Capitol Hill falsely believe there is no military requirement for this ship and it's approval is in jeopardy. We can use all the help we can get in getting this message through loud and clear.

• The spread of high technology weapons is increasing the risk to surface and air ASW forces faster than for submarines. We all know how difficult ASW is; after all, it was the Navy's top priority for much of the Cold War, and we spend billions of dollars in the effort. It still is a very challenging problem for us. Very few countries in the world have any significant ASW capability, so our submarines offer our national command authority a low risk option, one that can be as covert or overt as desired, and can operate at will in the littoral waters of the world even if the battle space above the ocean surface is still unsecured.

 Minefield detection and mapping is a real problem. You've heard me say this for years. Our hull-mounted submarine sonars are not good enough in detecting all bottom, moored or floating mines, and allow us to avoid them. The solution is an UUV that will allow us to stand off, and won't put our people or ships at risk. Our highest priority is the development of a near term, less than 4 years, interim mine reconnaissance system. The fleet currently has no capability to conduct remote, unmanned minefield reconnaissance.  Offensive mining also remains a valid submarine requirement. We need a follow-on to the Submarine Launched Mobile Mine to allow us to covertly lay minefields, particularly in or near harbors and in the shallow water littoral areas.

• We need to enhance our ability to support the land battle. An area that needs examination is the use of submarines to launch and/or control unmanned aerial vehicles for land reconnaissance. Our ability to strike targets ashore must also keep pace with the rest of the Navy with Tomahawk Block IV and follow-on strike weapons. This needs to include real time or rapid retargeting, and innovative ways to aid the troops ashore. It's not too far fetched to think of troops ashore calling for anti-tank or bunker busting bombardment from the ship's off-shore, and this being provided by a combination of submarines and surface ships using their strike weapons. And don't discount the need for some silver bullets in the form of conventional SLBM strikes.

 Communications is a critical area for integrated operations with submarines and other forces, joint and allied. The key problem here is achieving the higher data rates and compatibility with the rest of the fleet because of the limitations of submarine antennas. We must be able to communicate with anyone in a seamless and automatic fashion.

 Acoustic sensors have been our bread and butter for decades, and they're still as important as ever. We need better and more reliable towed arrays, improved hull-mounted arrays, more robust signal processing, and improved displays.

 We need to enhance the ability of 688 class submarines to support special warfare forces since we will have so few SEA-WOLF and New SSNs by 2005. The requirement is for sufficient hulls to support either a dry deck shelter or the Advanced Seal Delivery System (ASD). Communications and imagery support are also key to our ability to operate satisfactorily with special warfare units.

 Our periscopes today are the products of 1960s technology and need replacement. Many of our allies have submarines today with infra-red vision and/or laser range finders built in on their standard periscopes. Our commanding officers complain about not being able to see well at night, such as on counter-drug operations. The photonics mast/non-penetrating periscope offers the technology to use state-of-the-art devices to provide improved surveillance capability in all weather conditions, and give us greater freedom with sail location in submarine design as well. This technology must be perfected.

 And speaking of the sail, there are several enhancements that need careful consideration, including low observable features to reduce radar cross section, storage of special warfare equipment, and possibly built-in antennas.

 An anti-air weapon for self-defense against helicopters and ASW aircraft is also something we should be thinking about. Although our submarines still use their natural stealth well, even when they are at periscope depth nearly continuously, the mere threat of being able to take out an ASW aircraft would make a big difference to potential enemies, and subsequently in our ability to defend ourselves. It may not be a high priority now, but I would put it in the space and weight reserved category.

 Up to this point, I've concentrated almost exclusively on the attack submarine side of the house. Our SSBNs do their job so well, that we often take them for granted. I see no change in the requirement for us to maintain a credible nuclear deterrent force well into the foreseeable future. Rapid and flexible targeting, reliable communications, very high weapon system reliability, and of course the continued invulnerability of our submarines are essential. The D-5 missile system will not last forever, and nuclear weapons are not likely to go away. We need to begin thinking about what's next 20 years down the road.

I've laid on the table a number of areas where technology is important to satisfying fleet requirements. I doubt that I need to remind you that we are being squeezed very hard for money. Affordability will drive most everything we do for years to come. We must take advantage of open architecture designs and commercial off-the-shelf components whenever possible. We simply don't have the priority or funding to afford everything we would like, and we're being forced to make very hard choices on what to buy.



# THE ORIGINAL STEALTH FIGHTER.

Long before stealth technology was developed for military aircraft, submarines were perfecting the art of concealment. Today, the most advanced state of that art can be found on the new SEAWOLF attack submarine.

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attack submarine ten tinoes quieter than improved Los Angeles class submarines. SEAWOLF is abo twice as operationally effective as other existing attack submarines. And it will accommodate next-

accommodate nextgeneration combat systems as they come on line.

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ineplace-

Because

the need remains for a strong submarine force, maintaining this industrial base is a matter of national security.

The Navy's nuclear submarines are stealthy. But their contribution to our nation's defense should be clear for all to see.

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For submarine warfare and technology, the future is now.



# SUBMARINE PARADIGM SHIFTS by RADM William P. Houley NSL Symposium, 16 June 1994

I t is heartening to see how innovative and farsighted recent submarine operational commanders—Hank Chiles, Hank McKinney, George Emery and Mike Barr—have been in operating our nuclear submarines in ways relevant to fleet needs.

In tune with "...From the Sea", but more importantly in tune with the requirements of unified, numbered fleet and battle group commanders, adoption of what used to be secondary missions has been an important change for the Submarine Force.

A viable future for the nuclear submarine program, however, demands a great deal more than a change in submarine operations at sea. While the term *paradigm shift* has been over-used, it is fair to say that submariners need to effect paradigm shifts to a far greater extent than we have thus far, across a spectrum of activities from operations to acquisition strategy and process; to submarine design and flexibility; and to the selection and promotion of visionaries who can lead us to an assured future role for submarines which will be of equal value to our past contributions.

#### Hill Strategy

As has been described, and as you all know, Congress is presently debating a third SEAWOLF to bridge the construction gap until a new SSN Class (NSSN) design is complete and construction can begin. As of now, neither SSN 23 nor the NSSN is at all assured. Of importance is the fact the Administration, SecDef, SecNav and CNO strongly support the requirement to maintain the nation's capability to design and build nuclear powered submarines. While the arguments to maintain the industrial base are persuasive and have survived the scrutiny of the Bottom Up Review, submariners must develop the same strategy and aggressiveness in selling our program and addressing questions on the Hill that have worked to win approval of CVN 76 and continued DDG-51 construction at three ships, per year. All submarine people, civilian, retired and active-and submarine flag officers in particular-must become more proactive. There is little question that the Naval Submarine League's first, and perhaps only priority for the moment, should be to encourage Congressional approval of the Administration's submarine industrial base and military requirement program for SSN 23 and the NSSN. Presently, we seem to be supporting the actions of others. OLA and ONI efforts, and the Congressional submarine embarkations and tours of the Regional Crisis Demonstrator have all been helpful, but more, much more, must be done! There remain congressmen and senators, including some on the key committees, as well as influential Hill staffers, who don't yet understand the operational realities of real world submarine warfare developments or why new submarines are required independent of the industrial base issues. It is essential that we be as well organized as any other community in being ready and anxious to answer questions before they are asked.

#### The Number Problem

Having said that an effective near term Hill strategy is the obvious priority of the moment, many other issues compete for near term attention. Acting as requirements spokesman for the Submarine Force, Vice Admiral (now Admiral) Hank Chiles and Vice Admiral George Emery have articulated the importance of maintaining the number of nuclear attack submarine required to respond to projected national joint military requirements in peace and/or conflict. Many recent studies have examined the number requirement, including several conducted outside the Navy Department. The low end of the number range for the post-2000 era coming out of a JCS study was 52 SSNs. Other credible studies favor future SSN force levels of 55-70 SSNs.

The question we need to be concerned about is not what the right number is; rather, how can we assure any number.

Most would agree that the Administration's FY-95 budget request now on the Hill may shrink in the late 90s, but it probably won't grow. If we assume that the FY-95 submission even roughly resembles what is to follow, then about \$6 to \$11 billion, or an average of \$8.5 billion, of constant FY-94 dollars will be available to fund Navy Department ship construction. This, of course, must provide for everything from aircraft carriers to surface combatants to amphibious ships to auxiliaries, as well as nuclear attack submarines. If we are able to achieve a low end cost of \$1.5 billion per NSSN, (FY-94 dollars), and we assume the Department of Defense routinely requests, and Congress authorizes, 1-1/2 SSNs per year, the Navy would have to program about 20-25 percent of its long term ship construction plan for nuclear submarines. This is unrealistically high, whether compared to history or any other barometer. I might add the 25 percent is based on some very optimistic out-year considerations. Even if the Navy's efforts to reduce infrastructure are fully successful and the procurement budget grows in relative terms, it is unlikely the Navy could afford the low end number of 1-1/2 submarine authorizations per year. If true, an eventual force level of even 45 SSNs (1-1/2 per year x 30 year life) might be unachievable.

Granted, there are many ifs in this prognostication, but it is troubling that such a pessimistic outcome is not the result of worst case arithmetic.

#### Need for Visionaries

While the budget squeeze is the forcing function for innovative thought within the submarine community, there are plenty of other factors which suggest the need for introspection by a group which takes pride in not doing things simply because "We've always done it that way".

The CNO staff realign according to joint mission areas, "...From the Sea", and a general thirst for new ideas combine to create an environment where changes are possible.

Most believe we could benefit from some changes in the way we do business, although there is no consensus on what those changes should be.

Whether they are most needed in affordable submarine system acquisition, persuasive requirements articulation or operational matters is neither here nor there. But whatever the case, we have a need to identify the visionaries in our midst who can chart a successful way ahead.

While we want to maintain the professionalism and high standards which have typified our rich history, we also need to seek new ideas and new ways to do things so we can assure that the submariners' conviction that nuclear submarines are bound to be an essential component of our Navy's future becomes a reality.

In order to do this, change is essential. Retaining the qualities that brought us to the forefront is a great idea, but resting on our laurels is not.

We need to get out in front rather than defend yesterday's positions. What follows are some unrelated ideas, including, no doubt, some very bad ones. If they serve to stir up debate, they will be useful because out of such debate will surely surface (no pun intended) the innovativeness which will make nuclear submarines the consensus cornerstone of future defense planning that submarines proved to be in both WWII and the defeat of communism and the Soviet Empire in the Cold War.

#### Manning

Submariners argue that the cost of operating nuclear submarines is low. Given that this is certainly true relative to their design, R&D and overhaul costs, this argument seems to have kept us from pressing to effect significant reductions in crew size.

People are obviously expensive to recruit, train, retain and eventually, retire. But while the rest of the submarine forces around the world have generally halved crew size through the advances of automation and technology, we have improved our technology and fighting effectiveness with little change in manning. It's time to get on with it instead of explaining why not.

#### Eliminate Stovepipes

Why do we still have radio, ESM and sonar rooms? Why do we need about 25 men in the attack team at battle stations vice 6-8?

Why don't we take more complete advantage of technology already available to use operator/supervisory consoles which are identical and fully redundant for all of the functions associated with operating and fighting our nuclear submarines? We need to move well to the right of the welcome initiatives now being proposed.

The Commanding Officer should supervise a control room populated with several such consoles which display, control and coordinate information. Eliminate the manned radio room! Communications, both incoming and outgoing, should be managed in connection with command and control of the submarine as a member of a battle group (or not). N87, N6 and SPAWAR have moved communications rapidly in response to the urgent need to put submarines on the same switchboard as the rest of the joint force. We must encourage and further accelerate this effort.

The manipulation of sonar information and equipment should be done from the same kind of console as C<sup>4</sup>I and ESM/surveillance functions.

Similar displays and controls would be available for depth and

course control of the submarine, long ago consolidated into a single automated station in most other navies' submarines. And usually with the X control surface configuration we first experimented with in ALBACORE decades ago! The same or a separate console could control shifting or expelling variable ballast, the hydraulics and air systems and the operation and monitoring of hull openings.

Adoption of navigation, radar plot and visual display coordination of navigation charts and information from global positioning systems and laser gyro navigators would be identical to systems used commercially.

When the tactical situation requires, these same consoles would be devoted to the control and management of contact and weapons systems.

Since all consoles would be identical, the arrangement of displays and operators would be at the discretion of the commanding officer.

All of the hardware and as much of the software as possible would be commercial—off-the-shelf (COTS). Architecture would presumably capture the lessons of our own as well as those of successful commercial users who must have similar reliability and flexibility requirements, protected by logic that precludes software flaws in one logic chain affecting the total system's central nervous system.

Of course, the NSSN will pursue the direction of economy and increased redundancy advocated here. But is suggested that we need to run very fast vice jog. And our trend toward COTS should be greatly accelerated outside the nuclear propulsion plant.

So the stovepipes of a radio union, ESM union, ship control/diving party union, fire control, sonar and navigation unions would all disappear in favor of a single space populated with identical consoles which display and control all of the information necessary to operate and fight the submarine.

### **Reduction of Personnel Stovepipes**

One would hope the people stovepipes could also be reduced. One enlisted rating or NEC for each of dozens of systems is unaffordable and unnecessary. In principle, at least, it is suggested that submarines might be manned by three rating groups: one mechanical, one electronic and one general support. The first wo might receive additional training in nuclear propulsion or not. Only a few would have the advanced maintenance training required for sophisticated trouble shooting, since little such work would be done at sea except in the mechanical and plumbing systems which are not as easily patched around as electronics and computerized hardware.

The crew size would be greatly reduced and training reduced in breadth, if not length. The ratio of officers to enlisted might be richer and assignment of LDOs and Warrant Officers might be advisable.

#### Women in Submarines

I recognize and applaud CNO's decision to study this matter carefully before leaping to precipitous conclusions. Speaking strictly for myself, however, I believe submarines should lead, not lag, in the recruitment and assignment of women. The high overall quality of people in our force more than offsets the challenge of a two gender submarine. Tridents are already better designed for gender privacy than most surface combatants and SSNs present no insurmountable challenges.

If submariners are as smart as we claim to be, we should be smart enough to make this work rather than be at the end of the queue looking very reluctant to get on board the train.

#### Fuel Cells

Fuel cell technology bears watching. Not as a substitute for nuclear power, but as a complement to the SSN's traditional energy system. The efficiency is double that of the Sterling engine Air-Independent Propulsion system and reliability and safety have increased. U.S. leadership in technology should increase our interest in advanced energy systems, not decrease it. We must demonstrate this leadership outside, not just within, the nuclear area.

# Unmanned Underwater Vehicles

UUVs will be a huge force multiplier for SSNs. We have employed UUVs in the past and, in connection with our countermine warfare efforts, the Navy is working this important R&D initiative now. But the timetable is slow and restricted to UUVs which are launched and recovered into submarine 21" torpedo tubes.

Why not bigger UUVs with longer endurance and range? We

employed UUVs in the past and, in connection with our countermine warfare efforts, the Navy is working this important R&D initiative now. But the timetable is slow and restricted to UUVs which are launched and recovered into submarine 21" torpedo tubes.

Why not bigger UUVs with longer endurance and range? We can garage them in huge, stealthy sails or dry deck shelters or modules within the submarine hulls' outer envelope.

There are many missions for UUVs, but their principal advantage will be to extend the mother submarine's effectiveness in littoral warfare by allowing the SSN to operate where its survivability is greatest, yet reach into shallow, and perhaps mined, waters with its sensors and/or weapons to neutralize the threat and extend greatly the submarines operating envelope.

The UUV will be of great importance to the Joint Task Force Commander whose willingness to sail a nuclear reactor into shallow, potentially mined waters, can be expected to be a lot lower than the submarine's brave commanding officer.

# Endurance and Flexibility

In trading space and weight to make room for UUVs or mission modules, consideration can be given not only to the aforementioned smaller crew size but also to bunks for two vice three sections and sustenance for 60 vice 90 days.

Stealthy sails are being studied and may permit the opposite of the expected elimination of the *fin*. With reduced visual and radar crosssections, the sail may provide space for anti-air or expeditionary force support weapons or gear for embarked special operating forces or room for wide band antennas or even a return to the conning tower. More simply, in an age of no penetrating masts, the sail may become the nesting place for a tailored mission module.

Ideas are cheap, but some new ones are needed. They may affect submarine employment, design, flexibility, affordability or business practices. But we need speed on this ball, not just polish. If you agree there is a sense of urgency to do more, look for and promote the visionaries. We are blessed with wonderful people from whom they may be picked.

# NEW ATTACK SUBMARINE: OPTIONS FOR THE FUTURE

#### by Rachel A. McMillan

[Ed. Note: Rachel A. McMillan previously worked for the House Armed Services Committee and the Honorable Floyd Spence of South Carolina, now the Ranking Republican on the House Armed Services Committee. She is currently enrolled in Georgetown University's National Security Studies program. This paper was submitted in fulfillment of requirements in The National Security Decision Making Course taught by Adjunct Professor Arnold Punaro.]

#### Introduction

Nuclear attack submarines (SSNs), once the knights on an international chess board, face a danger more real than the Soviet Union. The Soviet threat drove the U.S. to continually move forward in submarine technology and capability. In the post-Cold War world or period, some believe the threat facing U.S. forces is limited to regional conflict. Missions not formerly required for attack submarines fighting the Soviets are demanded in a regional theater of operations. The present number of SSNs in the U.S. fleet is more than the country needs to meet these new threats. Compound this situation with the reality that the Navy's budget is underfunded by close to \$20 billion, and the prospects for acquiring new attack submarines is not readily apparent.

Complicating the situation for all new weapons systems are the reality and pressure of a shift in national priorities. With the election of President Bill Clinton, the national agenda and resources have shifted to domestic, non-defense concerns. Additionally, because of the significant force buildup in the 1980s, the defense industrial base is over capitalized, resulting in more capacity than needed today.

The New Attack Submarine (NAS), also called the NSSN, is the next generation weapon system that will be designed to meet the requirements of regional conflict. The NAS is intended to be a low cost, flexible platform needed for the emerging U.S. military strategy. The affordability of the NSSN, a primary requirement of the boat, poses a significant challenge to the designers to include the desired capability. However, if the NAS program does not start as scheduled (fiscal year 1998), the
country's long term ability to design and build submarines will be adversely impacted and perhaps irretrievable. That is, the country will not maintain the capability to meet force level requirements in the next century.

National security decision makers must consider the cost, the new threat environment including a lingering Russian navy, and other factors before approving or disapproving the NAS. There is a great deal of risk in either option. The major issues that should be considered are:

- Is there an enduring role for attack submarines in the New World Order? Will the NAS meet military strategy requirements as defined in the <u>Bottom-Up Review</u> and <u>...From the</u> <u>Sea</u>??
- Can the U.S. afford continued development and later acquisition of the program? Can it afford not to?
- What are the long term capitalization needs for the Navy to have the ability to build and design nuclear submarines in the future?
- What is the best option for the design and construction industrial base to preserve the capability to build nuclear submarines? Is the NAS enough?

### Military Requirements

The new strategic environment, illustrated by conflicts such as Operations Just Cause and Desert Storm, demonstrated that future U.S. war fighting would be conducted in non traditional locales, against non traditional actors, and forces would be employed in non traditional roles such as peace enforcement. The international community and economic factors play a larger role in determining which forces to use and under what circumstances forces may be deployed.

Laying the groundwork for small, but technologically sound naval forces, is the Navy's new maritime doctrine <u>"...From the</u> <u>Sea</u>". Attack submarines are key components, second to the aircraft carrier battle group, in fulfilling the Navy's operational capabilities requirements. These requirements will enable the Navy to execute its new direction and encompass command, control and surveillance, battlespace dominance, power projection, and force sustainment. The security environment is no longer the open ocean, but the littoral, presenting many different challenges to maritime forces. Submarines, and in particular the NAS, are seen to be central to meeting many of these challenges. <u>"...From</u> the Sea" defines the difficulty distinctly:

"...The littoral region is frequently characterized by confined and congested water and air space occupied by friends, adversaries and neutrals--making identification profoundly difficult. This environment poses varying technical and tactical challenges to Naval Forces...For example, an adversary's submarines operating in shallow waters pose a particular challenge...Some littoral threats...tax the capabilities of our current systems and force structure. Mastery of the littoral should not be presumed. It does not derive directly from command of the high seas. It is an objective that requires our focused skills and resources..."

The Clinton Administration's <u>Bottom-Up Review</u> (BUR) defines the threats facing the SSN force as military and economic. Seemingly based on <u>...From the Sea</u>, the missions identified by the BUR for SSNs are:

"...regional sea denial, task force support, precision strike, forward presence, surveillance, and special operations. Whether serving as key elements of joint task forces or naval battle groups, or deployed as independent units, attack submarines play an important role in U.S. defense operations..."

The BUR went on to state "[t]here is little reason [for the U.S.] to continue procuring an extremely costly submarine optimized to fight a foe that to a substantial degree no longer exists...The SEAWOLF, like existing U.S. attack submarines, was not optimized for regional conflict...A submarine designed specifically for regional conflicts would be more effective in those situations than the SEAWOLF design or existing U.S. attack submarines."

At the close of the Cold War, the U.S. Navy possessed nearly 90 SSNs in its fleet. Force level requirements were determined by the BUR to be 45-55 submarines. Options enabling industrial base considerations were examined before this number was reached. The options took into account the "requirements of regional conflicts and presence operations, manpower and training needs, the present capabilities of U.S. attack submarines against foreign submarines, overhaul and refueling schedules, force age, and the attack submarine retirement profile". The BUR concluded that fewer than 45 attack submarines would not meet war fighting or peacetime requirements. Additionally, approximately 1.5 submarines must be built per year to maintain the new force level.

Stealthiness will be the NAS's most effective capability. By combining stealth with endurance, the NAS will be able to execute a wide array of missions of which only the submarine is capable. Covert surveillance and intelligence gathering can only be accomplished if the subject being watched is unaware of this activity. The stealthy SSN can detect activities such as the development of advanced weapon platforms or potential hostile action by a foreign actor. Precision strike, such as the Tomahawk cruise missile launches in Operation Desert Storm, is a powerful tool in regional conflict. The target may be hundreds of miles inland and not detect the weapon until it is flight or upon impact. The origin of the launch is extremely difficult to locate. Other covert tasks such as, special forces operations, mine countermea sures, targeting and launching unmanned, undersea vehicles, make the NAS more capable of entering hostile waters.

The most compelling example of the SSN's effectiveness in regional conflict was the sinking of the Argentine cruiser ARA BELGRANO. This sinking led to the subsequent withdrawal of the Argentine fleet during the early stages of the Falklands conflict. The British SSN's mobility, stealth and endurance were proven assets. Submarine stealth and endurance provided the British Navy the invaluable battle group support, early strike warning, surveillance, and special forces insertion needed to win the war.

## Affordability-Can the U.S. Afford NAS?

The Navy's Shipbuilding and Conversion (SCN) account is underfunded in fiscal year 1994 dollars by \$2 billion.<sup>1</sup> The Navy's Recapitalization plan requires 1.5 new attack submarines to be built per year at a rate of \$2.2 billion each. In what was an extremely difficult process for the Navy and the Joint Chiefs of Staff, the NAS was maintained during the building of the Navy's Recapitalization plan. In recent testimony to Congress, Vice Admiral Lopez, the Deputy Chief of Naval Operations for

<sup>&</sup>lt;sup>1</sup> \$2 billion represents the FY 95-99 average.

Resources, Warfare Requirements and Assessments, expressed the Navy's commitment to this program and explained how the Navy plans to protect the shipbuilding account:

... To meet this challenge, we will have to continue reducing our infrastructure and thinking of new ways of providing Naval expeditionary capabilities at lower costs...

It is worth noting that the situation we face is more difficult than the last time the Navy faced a significant decline in its resources. During this period Navy funding declined 26 percent in real terms. Despite this decline, the SCN account, for example, averaged 11.5 percent of Navy funding over the period. Additionally, funds in the account averaged \$9.4 B[illion] per year (in FY 94 CB\$) over the final five years (FY 71-75) of the spending decline. By contrast, for FY 95-99 the comparable figure for SCN is \$6.4 B[illion] (9.6 percent of Navy funding) and the average amount we will require to sustain the FY 99 fleet is about \$8.4 B[illion], assuming unit costs similar to those contained in the FYDP [Future Years Defense Plan] years...

In 1991, Under Secretary of Defense for Acquisition Don Yockey, defined the primary requirement for the NAS as affordability. In FY 1995, President Clinton is requesting \$507.3 millions in research and development (R&D) for the NAS program in the U.S. Navy's budget. Since FY 1991, \$480.5 million have been authorized and appropriated by Congress for NAS R&D, bringing the total close to \$1 billion. The question quickly arises, should significant sums of money be spent on that program in an extremely constrained budget?

The DAB reviewed the NAS in 1992 and granted approval for the program to proceed with Milestone 0, permitting the Navy to begin exploring conceptual design alternatives. Deputy Secretary of Defense John Deutch instructed the Navy to conduct a Cost and Operational Effectiveness Analysis (COEA) with the guidance, "that the Navy should consider a broad range of submarine alternatives, avoid arbitrary restrictions in design characteristics, and incorporate emerging technology where appropriate". Six alternatives were considered, ranging from additional SEAWOLF procurement to non-nuclear attack submarine alternatives.

Forwarded to Congress in late September 1993, the COEA concluded, according to Senator Alfonse D'Amato (R-NY), "the 688I Upgrade...can carry out the missions, but it is more vulnerable than other ...alternatives. The acceptable level of vulnerability is a matter of judgment". The BUR iterated that two of the most important considerations to be considered for determining fleet size are affordability and maintenance of the industrial base. These requirements cannot be met with additional procurement of 688I SSNs. Simply buying more 688I submarines will not preserve the design and technology base essential for future capability requirements.

The Milestone I review of the NAS took place in January 1994. Approval for Milestone I did not occur, but then-Under Secretary of Defense for Acquisition Deutch ordered that additional cost and program analysis be undertaken in order to assemble "the strongest possible rationale for proposed modernization programs if we [Department of Defense] are to be successful in explaining major new expenditures to the public and the Congress". Nora Slatkin, Assistant Secretary of the Navy for Research, Development, and Acquisition, was tasked with leading a technical review team to examine the NAS design ability to "perform its military missions" and, also to provide Secretary Deutch with an "independent check" to better equip DoD in support of the NAS through the Congressional budget process. The technical team review and all the information requested have been completed and it strongly endorses NSSN continued development and essential deployment.

#### Industrial Base

The nuclear shipbuilding industrial base is divided into three communities: ship construction shipyards, nuclear-certified naval shipyards (NSYs) and the nuclear propulsion plant and other component manufacturers. These either integrate or are supported by design laboratories. The construction of nuclear submarines is now largely supported by single suppliers. In the case of the construction shipyards, the decision was made to maintain two nuclear capable shipyards, "thereby mitigating the risk to the industrial base". This section will not fully examine the NSYs since they are subject to the Base Realignment and Closure Commission in 1995 and how to reallocate their workload is too uncertain at this time.

Keeping two shipyards alive, Newport News Shipbuilding in Norfolk, Virginia and Electric Boat at Groton, Connecticut, costs more than consolidating all nuclear shipbuilding at one. The DoD examined the cost of a *smart shutdown* at NNS, and building a third SEAWOLF attack submarine and later the NAS at EB. The BUR recommended the latter option because it was "judged to be the better industrial practice and had the added benefit of providing the nation with a third state-of-the-art SEAWOLF attack submarine at a cost of only \$1.2 billion more than the first option, which provided no third SEAWOLF.

Nevertheless, the shipbuilding industrial base may not be able to survive even with the SEAWOLF, one NAS per year and a nuclear aircraft carrier (CVN) every four years.

Looking at the backlog for the shipyards painfully illustrates this reality. In 1992, EB revealed in testimony before Congress that there were six SSN 688 Class ships, six Tridents, and one SSN 21 in its backlog. An additional SSN 21 was awarded to EB in the FY 1993 budget after Congress overturned President Bush's rescission request for the second SEAWOLF. All of the 688s will be delivered by 1995, the SSN 21 and Tridents' delivery will be 1997. The NAS would not begin until 1998, if the DAB approves Milestone I. Even with the SSN 22, this is not sufficient to maintain the unique facilities at Groton. EB has already reduced employment significantly at its Quonset Point shipyard. At its peak in 1989, Quonset Point employed 4,500 people; today employment is under 3,000. The gap between SSN 22 procurement and the NAS will cause EB to let go many more workers unless the third SEAWOLF is procured.

NNS is in a similarly difficult situation. In 1988, NNS employed 31,000 people. In April 1994, NNS announced it would be laying off 7,000 additional people from its submarine manufacturing facility by 1995. This will bring the total to 15,000, less than half its 1988 size. NNS will deliver the last 688 and one aircraft carrier, the STENNIS, in 1995. The UNITED STATES (CVN 75), to be delivered in 1998, is the final carrier in the current backlog. If approved by Congress in the FY 1995 budget cycle, CVN 76 will be the remaining nuclear shipbuilding program for the yard. The massive overhead of these facilities will translate into the cost of the carrier with no additional work. Once the employment level drops below 15,000, it is questionable whether the yard can be kept open at all. Only with submarine dismantling, refueling overhauls, sealift vessel construction and commercial shipbuilding would NNS remain a viable shipyard. However, the Administration has not advocated a shipbuilding construction subsidy to enhance U.S. shipyard competitiveness for commercial work internationally.

The propulsion plant component production facilities are equally unique and practically irreplaceable. The fuel fabrication facility must undergo a time consuming, arduous process to remain a viable supplier. Licensing and an on-sight auditor from the Nuclear Regulatory Commission are required by the Atomic Energy Act of 1950, as amended. Safeguarding and security for this facility include the cost of physical security, i.e., specialized fencing, metal and materials detectors, other equipment, and security personnel. The size of the security force at the fuel core fabrication site is greater than the police force for Lynchburg, Virginia, the nearest city. Compound these prerequisites for doing business with other factors such as the numerous Navy inspections, environmental impact statements, security clearances and training for personnel, and the cost and time to establish the workforce and production capability are significant. The workforce must remain qualified and the product, of course, the actual fuel core, must meet the Navy's standards for safety and excellence, arguably the highest.

If the industrial base were slowed, shutdown *smartly*, or shutdown altogether and later reconstituted, the effect would be devastating. As one recent study on the nuclear submarine industrial base found:

"...In theory, the submarine industrial base can be reconstituted, although not necessarily in its current form...Reconstituting a base that disappeared several years earlier could require as much as a decade and several billion dollars. It is not clear that the nation would be able to generate and maintain the political support necessary for such an undertaking..."

Critical vendors who operate under the same rigid, qualityintensive stipulations as the major manufacturers find their survival at risk. Indeed, many have gone out of business or the work has been consolidated with one vendor due to excess of capacity. For most of these businesses, there is no commercial alternative. As Admiral DeMars stated in his 1992 Naval Nuclear Industrial Base Report:

"...For most suppliers, the Navy nuclear work load represents 70 percent to 100 percent of their business. Even with the CVN 76 components in FY 93, work loads will drop by over 50 percent in the next few years and suppliers will be operating significantly below capacity. These suppliers, for the most part, have few alternatives as their ability to compete for commercial business is limited due to the cost of the technical controls and practices established to meet naval nuclear quality requirements..."

The unique technological superiority of these component manufacturers and designers has resulted in the Navy designating them critical to maintain. The skills of the personnel involved go beyond the actual engineering and related training received. A significant amount of black art enhances the products' quality and the progress of the program. These skills are not only worth retaining but insuring a future for them. With such a drastic decline in nuclear naval procurement, and a practically nonexistent commercial nuclear field, the future for maintaining the nation's nuclear expertise is bleak. Inspiring talented, new individuals to enter a program with slow growth and little to no challenge will affect the quality of the program. The combined team of the Navy, industry and government laboratories has produced propulsion plants that now last the life of the hull. This is possible because, the "day-to-day problems of designing nuclear propulsion plant equipment often stimulate the best ideas for the next design". Make-work cannot sustain this type of person and capability. "To be effective, all involved must know they are contributing to an important product and the fruits of their effort will be tested and used."

If the force level of 45-50 SSNs is to be maintained, the first replacement sub will be required by 2012. If submarine construction were to cease now and new production is required in 15 years, three or more submarines must be built per year simply to maintain the force level. This schedule is entirely unlikely if the industrial base must be reconstituted. If low rate production continues, the industrial base and the capabilities that have provided the safest, most technologically superior platforms in the world will be preserved. Implementing low rate production will ensure that replacement boats arrive in the fleet meeting the force level requirements.

## **Options for the Fature**

The need to procure the NAS, or NSSN, is evident. The threat environment existing today includes enduring missions from the Cold War period, such as anti-submarine warfare, including a shallow water, anti-diesel submarine, a littoral-oriented threat, as well as the modern and capable Russian open ocean threat. Maintaining a force level of 45-55 submarines as dictated by the national military strategy, demands the nuclear shipbuilding program continues. While the deactivation rate of SSNs could be slowed to maintain that level, the ability to build and design future submarines ready for future threats will be jeopardized.

Comparing the two options; low rate production or a dismantling of the industrial base to be started again at some future point in time, the costs to the country becomes obvious.

The thousands of suppliers and decades of expertise in manufacturing processes, engineering, and other skills unique to submarine construction face extinction. A few billion dollars spent today to avoid expenditures equivalent or larger in the future is a wise investment. It is dubious that reconstituting the nuclear shipbuilding industrial base could occur in less than a 10 year period and at less than several billion dollars in current year dollars. This newly reconstituted industrial base would not regain the level of quality in design and manufacturing present today for perhaps longer than a decade. The legacy of the high standards and quality to which the industrial base has been held, is demonstrated by the recently celebrated one hundred millionth nautical mile sailed by the U.S. Navy without a single human reactorrelated injury. Low rate production is the preferable option to reconstitution for sustaining the capability to build and design SSNs, and to save taxpayer dollars.

Without the capability to design and build submarines, this country's ability to protect against aggression, deter and defend its interests around the world would be irreparably damaged. Valuable resources and sunk costs would be wasted as would the benefit of the experience of the manufacturing base. The country sits on a debt of enormous proportion. Therefore, making the investment today wisely, will insure that the technology's design team and skilled craftsmen will be there for the submarine construction program in the future. Once the DAB makes its final review and the NAS's costs are contained, the NAS program should go full speed ahead.

# DOWNSIZING TO DOLLARS A Recipe for a Hollow Force by CDR C.D. Slack, USN

[Editor's Note: CDR Slack graduated from the Naval Academy in 1978 and following nuclear and submarine training reported to ETHAN ALLEN. He subsequently served as Radiological Control Officer on HUNLEY and as Engineer Officer of NR-1. After a tour in OP-02 in the Pentagon he served as Executive Officer of RICHARD B. RUSSELL. He is ordered as Commanding Officer USS OHIO (SSBN 726)(Blue).]

#### The Challenge

How does a major multi-billion dollar corporation redefine its operating strategy, expand its product line, fulfill growing customer expectations and downsize from a projected annual budget of \$109 billion to a revised annual budget of \$69 billion without impacting its productivity?

The question posed is not a graduate level business school case study, it is real life. The corporation is the U.S. Navy. The dollar figures are not hypothetical, they are harsh reality and optimistic at best. The future readiness of the Navy and threat of returning to a *hollow force*, both hinge on how this difficult question is answered.

Assuming the organization is nominally efficient, there is insufficient room to horizontally cut \$40 billion through belt tightening and reorganization initiatives alone. The fat is gone, weeded out during programming and budgeting reductions over the last three years. Today's budget cuts are cutting muscle, yet mission requirements, while adapting to the new strategy articulated in ... From the Sea remain basically unchanged. In fact, relative to the shrinking force structure, the requirements are growing.

A key question that must parallel any downsizing initiatives is what requirements can we (must we) do without? The pace of Navy downsizing forces focus on the bottom line with insufficient attention focused on what requirements are most important to fulfill the Navy mission and what requirements the Navy, Joint Staff and National Command Authorities are willing to give up to achieve the downsizing objectives. To meet the programming guidance provided by OSD some previous mission taskings (requirements) must be eliminated and any emerging requirements must be matched with zero sum offsets.

<u>From the Sea</u> committed the Navy to a new strategy. In the rush to downsize, there seems to be an implicit assumption that the new strategy and associated threat is less demanding, less imposing and hence less expensive to counter than bipolar confrontation once posed by the Soviet Union. Before downsizing blazes forward, this assumption needs to be carefully evaluated and either explicitly accepted or rejected. The resources required by the Navy are fiscal, personnel, force structure, infrastructure and overhead, are based on requirements. Hence, any approach to answer the postulated question on how to downsize, must first and foremost define the requirements driving Navy operations. Next the resources needed to satisfy the defined requirements must be compared to resources available. If the result is a deficit, then the lowest priority requirements need to be eliminated until resource-vs-requirement parity is achieved.

### Assessment of the Critical Assumption

The bipolar threat of the Cold War era provided a focused threat and enabled concentration of forces against a single enemy with reasonably well defined capabilities. The regional threats now providing the centerpiece of naval strategy are less defined, less conventional and more dispersed. One could argue that the task is now harder, not easier. Flexibility and dispersal call for a depth in forces, not consolidation.

Littoral warfare also presents new challenges not found in blue water conflicts. Shore based air power, non-nuclear powered submarines, mines, high speed missile-firing patrol boats and shore-fired missile batteries, to name a few, are present in this new environment. Additionally, the near-shore acoustic and electromagnetic environment is more complex, cluttered and harder to model and predict.

All-out war between superpowers is no longer likely and has been replaced with potential for multiple hot spots requiring capable, mobile forces able to respond on short notice. Large standing forces that take months to deploy are not likely to fit into future contingencies. Accordingly, the flavor of future forces will emphasize mobility and agility. The entire defense force structure needs to be reviewed in light of this change, and dollars should be spent on national defense priorities unconstrained by service boundaries.

Finally, the naval strategy calls for independent, flexible, mobile forces able to respond rapidly from international waters. All services except the Navy require access to foreign sail in order to operate forward. Only the Navy-Marine Corps team offers a non-intrusive self sustaining presence and combat capability.

It would appear, therefore, that requirements to accommodate the new threat have at least maintained status quo, if not grown, when compared to requirements for Cold War containment. It is difficult to imagine how shrinking forces will be able to combat a growing list of requirements. Downsizing cuts the flexibility and depth of the organization, opposing the precepts of our new strategy. The critical assumption is flawed, and hence the rush to match dollars without recognizing the growth in requirements is setting the Navy dangerously onto the shoals of a *hollow force*.

Admiral Kelso summed it up well before Congress when he testified, "Accomplishing all these changes [personnel and force structure reductions] while continuing to fulfill what seems to be an ever expanding demand for naval forces has not been easy..." If we are to continue downsizing, as we must, a balance between downsizing forces and downsizing requirements must be retained.

### Will the Evolving Process Mature in Time

The OPNAV reorganization and increased fleet involvement are steps in the right direction, yet parochialism, stovepipes, and rice bowls persist. Concomitant with the OPNAV reorganization came a change in the planning, programming and budgeting process. Seven Joint Mission Area (JMA) and two Support Area (SA) Assessments are supposed to be requirements-based assessments to define and prioritize what the Navy needs to carry out its assigned missions in the respective warfare/support mission areas. An Investment Balance Review integrates the results of the individual JMA/SA assessments and focuses the process of integrating resources with requirements while a Resources and Requirements Review Board is meant to be the top level decision forum to ensure a proper, executable balance has been achieved.

<sup>&</sup>lt;sup>1</sup> Admiral Frank Kelso, Chief of Naval Operations, testimony before the Senate Armed Services Subcommittee on Regional Defense and Contingency Forces, 29 June 1993, p. 2.

The Chief of Naval Operations Executive Steering Committee provides final mediation and four star oversight of the outcome. Other recent initiatives, the DOD Bottom Up Review and a relook at the roles and missions of the four services, demonstrate an understanding for the need to set requirement priorities, and then to fund the top of the list and accommodate downsizing to meet fiscal guidance from the bottom of the list.

The learning curve is still fairly steep and any new system will experience growing pains. Extreme fiscal pressures, however, are subverting the purity of the process and driving decisions in advance of requirement prioritization. Resource downsizing is already outpacing requirements downsizing. Requirements must shrink in a downsizing Navy and offsets must be identified when new requirements are added. Extreme discipline will be required or the end product may be affordable, but may not be the optimum balance to accomplish the priority objectives and taskings of the organization.

Before deciding on what to cut, a fundamental decision of how much is enough needs to be made. The JMA/SA assessments should be providing this input. Secretary Aspin recognized there was more to do than resources available and articulated this well before a Senate subcommittee, "In the last analysis it's essentially a political judgement about what level of comfort...you [Congress] feel about the various capabilities that we should build into the defense budget."<sup>2</sup> Similarly, Admiral Kelso recognized the need for careful downsizing when he stated, "If our future plans are overly optimistic regarding how fast and to what extent we can draw down the Navy, the people who will pay the price are our sailors, the most important element of a ready Navy."<sup>3</sup>

## Avoiding the Hollow Force Must Become More Than Rhetoric

Senior leadership has articulated a strong commitment to avoiding a return to the *hollow force*. It appears, however, that the whirlwind pace of change and downsizing may be clouding the

<sup>3</sup> Kelso, p. 8.

<sup>&</sup>lt;sup>2</sup> Secretary Les Aspin, Secretary of Defense, testimony before the Senate Appropriations Committee, Defense Subcommittee Hearing, 20 April 1993, p. 5.

big picture, illustrated by subtle inconsistencies evolving between theory and practice.

The threat of a *hollow force* has become the theme de jour, however rhetoric must be replaced by action. To define the indicators of the *hollow force*, and outline the causes and lessons learned in the seventies is not enough; actions speak louder than words. Overuse and misuse of *hollow force* jargon will dilute its meaning and effectiveness.

The CNO stated, "Eliminating training and education would be a false economy that would result in less capable units and decreased readiness."<sup>4</sup> Contrary to this vision, the training and education establishment has been directed to slash between \$2.8 and \$6.4 billion dollars across the Future Year Defense Plan (FYDP). This is a glaring example of downsizing to fiscal targets as opposed to requirements-based downsizing, and erodes a key mission area that contributes directly to readiness.

It is appropriate to focus on a concise cautionary list taken from CNO testimony before congress.

"We characterize the difficulties coming out of the 1970s as hollow force, defining that term as:

Insufficient quality manning Inadequate individual training Inadequate training resources (ammunition and fleet services) Limited steaming and flying hours Shortage of on board replenishment spares, and Deferred maintenance."<sup>3</sup>

Perhaps a copy of these symptoms should be posted conspicuously for all who form budget policy to consider.

Secretary Aspin has emphasized, "We do not - underline "not" five times - do not want to have a repeat of the *hollow force* situation when we downgraded, when we downsized the military

<sup>5</sup> Ibid, p17.

<sup>&</sup>lt;sup>4</sup> Admiral Frank Kelso, Chief of Naval Operations, testimony before the Military Forces and Personnel Subcommittee of the House Committee on the Armed Services, 9 March 1993, p. 13.

after Vietnam; we do not want to have a hollow force."<sup>6</sup> We need to ensure this strong statement is backed up with actions and forceful decisions based on indicators and lessons that have been learned before.

# Requirements Reduction Lags Force Structure, Personnel and Budget Reduction

Many current downsizing decisions are based almost exclusively on fiscal considerations. The people, dollars and force structure are shrinking, but the requirements have yet to be eliminated. This approach calls on Navy people to do more with less, or more succinctly stated, work harder and longer. This reduces quality of life, reverses years of effort and commitment to look out for the well-being of our sailors, and in the past has led to the exodus of skilled officers and sailors needed to operate the fleet. Also this approach challenges the precept of Total Quality Leadership, which stresses working smarter not harder or longer.

Admiral Kelso testified before the Senate Armed Services Committee, "Dramatic reductions in force structure have been accompanied by heavy demands for naval forces from the Unified Commanders."<sup>7</sup> When requirements grow or force structure declines, OPTEMPO is driven higher, hedging on a commitment to quality of life for Navy people.

In just four years, from 1990 to 1994, our battle force has shrunk by 25 percent, a reduction of 133 ships. Concurrently, naval forces continue to respond routinely and on short notice around the globe. Operation Southern Watch, Restore Hope and Provide Comfort all occurred within the past year in addition to presence requirements in WESTPAC, CENTCOM and EUCOM, and counter narcotics taskings in the Caribbean, Gulf of Mexico and Eastern Pacific.

A lesson learned from the 1970s is the need to fund adequately for maintenance availabilities and spare parts critical to material

6 Aspin, p. 6.

<sup>7</sup> Admiral Frank Kelso, Chief of Naval Operations, testimony before the Senate Armed Services Subcommittee on Regional Defense and Contingency Forces, 29 June 1993, p. 1. readiness. Yet today, maintenance availabilities and spare parts are being deferred to balance the near term bottom line. Maintenance backlogs have grown to over 150 airframes, 250 aircraft engines, 30 unfunded ship availabilities and 3 deferred overhauls.

Maintenance of real property (MRP) is also under funded, even by commercial industry standards. In the shore based infrastructure, critical repair<sup>s</sup> backlog exceeds \$2 billion and the backlog is growing at a rate of 20 percent per year, the result of continued underfunding at only 25-30 percent of requirements. Total MRP backlog is nearly twice the critical backlog. Without these needed repairs, the capital plant is decaying, ultimately driving up long term costs to replace facilities that have degenerated beyond economical repair. The Air Force appears to have a firmer grasp on this concept based on the immaculate appearance of their infrastructure. It is time to fully fund maintenance of Navy shore infrastructure and downsize the inventory of property, plant and equipment to one that is affordable to properly maintain.

In short, current day requirements are being funded beyond fiscal means, damaging a delicate balance between near term operating funds and reinvestment in capital plant and equipment accounts. Unless there are prospects for a windfall in the out years, bow waving maintenance to the future is negligent disregard for the lessons of a *hollow force*.

Manpower is well on the downslope to 400,000, and deployed ships are already reporting critical manning shortfalls. Mission requirements for these ships have not subsided. Shipboard Billet Allowances have been horizontally reduced to 90 percent of M+1, wartime mobilization manning, yet required operational capabilities/ projected operating environments (ROC/POEs) have not changed. Headquarters staffs are being similarly reduced an arbitrary 5 percent per year at the same time those staffs are being tasked to play a greater role in requirements validation, programming, budgeting, and numerous data calls for base realignments and consolidation.

Over the past three years, Navy military end strength has been reduced 90,000 people. Requirements, expressed as valid billets,

<sup>&</sup>lt;sup>8</sup> Critical backlog - backlog of maintenance and repair deficiencies that impact mission/safety/quality of life/ environmental and should be corrected within one year.

exceed end strength by over 28,000, posing a dilemma for detailers who must decide which billets to man. This is a case of the cart before the horse and results in large part from horizontal skimming as opposed to conscientious decision making to terminate a billet based on elimination of a requirement or vertical cut of a function. Organizational effectiveness simply cannot be retained if resources are cut before deciding and prioritizing which requirements to do without.

### Alternative Approaches to Downsizing

A number of options exist to tackle the process of downsizing. A partial list would include:

 Horizontal skimming across functions until weak elements fail and fall off (survival of the fittest)

 Fair share downsizing, reduce all functions of the Navy a proportional amount

 Arbitrary vertical cuts to meet prescribed fiscal guidance a form of requirement-based downsizing by mission priority. All requirements can be expressed in terms of stand alone, fully priced modules which can be listed in order of national task priorities.

All but the last alternative should be discarded as irresponsible approaches to one of the largest management challenges Navy leadership has faced in the last few decades. Horizontal skimming *hollow forces* with a deleterious impact on quality of life and ending in slow death.

Proportional downsizing may sustain balance, but it will not sustain the ability to accomplish an undiminished list of requirements. If it were truly possible to execute a proportional reduction, this approach may avoid the *hollow force* and prevent imbalance from hedging one part of the force at the expense of another (such as deferring or delaying maintenance to pay for operations or force structure). It does not retain the same capability as the old force.

Vertical cuts help preclude *hollow forces*, but they do not ensure an organization remains mission capable unless the right programs are retained in the proper mix. Fiscal guidance can be achieved by any number of vertical cut combinations, indicating that vertical cuts, while preferable to horizontal skimming, are not of themselves the end-all solution to responsible downsizing. A prioritized requirements driven approach that defines mission requirements in terms of all the resources needed to accomplish that mission is proposed as an effective approach to the downsizing dilemma. The module would include personnel, force structure, overhead, infrastructure, research and development, operations and maintenance, training and education, and capital plant repair and replacement associated with a given mission requirement. The current OPNAV process closely approximates this approach.

If done correctly, the self-sufficient requirement modules, covering all current requirements would be ranked in priority order. When fiscal guidance is received, those lowest ranking modules which exceed resources available would be deleted and national policy makers would be made aware that those requirements are no longer executable and have been stricken from available taskings.

In addition to being clearly linked to requirements, the defined modules would preclude a *hollow force* by fully funding missions committed for accomplishment and eliminating the modules that are unaffordable.

### **Obstacles to Success**

It is imperative that Navy planners, programmers and top leadership develop a process which deals with downsizing in a rigorous, requirements based manner. Despite best intentions, even a fool proof system faces numerous obstacles from both within the organization and without. Rice bowls, fenced programs, special interests and stovepipes have long eluded consideration in discussions on downsizing, and parochialism has been an obstacle to decision making for the greater good of the organization. Too often, programs which once fulfilled a noble purpose outlive their usefulness. Stovepipes need to take on new visibility and be placed under the control of the supported Regional Line Commander. Empowering the customer will enhance prioritizing requirements and should help overcome some of the obstacles posed by special interests.

There is a propensity for instant results in the downsizing environment. Too often, preliminary study results which show potential savings are instantly adopted as real wedges in the FYDP. This has two negative effects; first, study results and implementation results are two different things, but cuts, once levied, are hard to recoup and hence a priority program may end up underfunded from this premature *cost saving* accounting. Second, lower echelon organizations become reluctant to discuss potential plans openly for fear items on the table for discussion and debate will become fait accompli savings in advance of any formal decision making. More discipline is needed before those in green eye shades capture potential savings to accommodate fiscal shortfalls.

Explosive growth in regulations at both the federal and state level, as well as accelerating litigation, also challenge the mission of the organization. A most vivid example is the rapid growth in environmental compliance projects that have become essential to continued operation of Navy ships and bases, both in CONUS and overseas. In addition to the direct cost represented by these requirements, there is an indirect cost from compliance forced on industry and suppliers which is passed along to the Navy as a customer.

The military has long been a proving ground for social change, and during the Cold War build up, the shortage of qualified personnel required establishing many social services to attract and retain personnel with special limitations. Substance abusers, single parents, perpetrators of family violence and others with nondeployable limitations need to continue to have the opportunity to serve, but must not be allowed to linger without evolving to full up rounds. World wide assignability is the standard for naval personnel. The return on investment of social rehab/support programs needs to be evaluated to determine whether these *special interest* programs still qualify for priority protection in a fiscally stringent environment.

Finally the politics of pork grinds on. Military leadership may put forth elaborate plans, based on defense guidance and prioritized requirements, but they may lack a politically correct district balance. Reserve end strength, base closure, overseas maintenance and selected acquisition programs are ripe targets for congressional meddling. A prime example can be found in the heretofore weak support for operations and maintenance accounts, although fortunately, the tide is turning. This account is not clearly linked to district spending and hence often lacked Congressional championship to avoid being whittled away as a convenient source of *amorphous* pork offsets. Shore base downsizing, which has lagged downsizing in other accounts, is subject to extreme political pressure, and required establishing a non partisan commission to overcome the power of politics. In some instances, the objectives of downsizing, and defining an optimally balanced efficient organization, is at odds with the objectives of politicians which include providing jobs in their districts. This external micromanagement of how limited resources are applied in fulfilling the organization mission impacts the process of downsizing.

#### Conclusion

We cannot maintain the same productivity with significantly fewer resources. To sustain a strategic advantage, we must focus on core competencies we can afford to do well and fund them fully. Lesser priority taskings must be divested.

It is not enough that we meet our bogey and match program spending to dollars available. We must also articulate what we can no longer afford and stop doing it, or the expectation will remain that we can carry out all our previous missions, plus new requirements for environmental compliance, contingency response, humanitarian assistance and forward presence despite less resources.

More than bold statements and dogmatic reference to the hollow force is required to prevent its return. We all bear some responsibility for the future of our Navy. This requires a modification to our age old can do spirit, and will require paradigms to be broken. "That's the way we've always done it" is inadequate justification for charting our future. The time has come for brutal honesty, stating conditions as they are. No commander wants to say he cannot complete an assigned mission, but there are limits especially if we are to honor commitments to quality of life for our people. Driving people to longer hours to do more with less is an irresponsible solution.

Unless we get a firm grasp on a process to downsize requirements and national defense commitments at the same time we downsize resources we may return to a *hollow force*. It is time that good watch standers recognize the symptoms of a *hollow force* has a cancer-like effect, resulting in casualty and sound the General Alarm to notify and muster all hands to combat the looming casualty. Parochialism, rice bowls, fenced programs, and stovepipes have no place in the damage control tool bag. Clear deliberate actions must be taken now to match requirements with resources. The survival of our Navy and the well being of our nation depend on the outcome of this challenging, real-world case study.

Downsizing emphasis must focus on prioritized warfighting requirements subsequently transcribed to resource requirements.

If this approach is not chosen, the force will hollow, people will be frustrated with working conditions and by trying to do too much with too little, there will be mediocrity across the board. It would be much better to retain a ready force fully funded to accomplish a smaller but clearly defined mission.

# INACTIVATION ANNOUNCEMENT

USS GURNARD (SSN 662) inactivation ceremony is scheduled for 12 August 1994, at the Naval Submarine Base, San Diego, CA. Contact YNC(SS) Moore at (619) 553-9149/8 (commercial), 553-9149/8 (DSN) or write USS GURNARD (SSN 662), FPO AP 96666-2342.

# \*\* IN REMEMBRANCE \*\*

CAPT Robert B. Brumstead, USN(Ret.)

LT John W. Eckman, USNR

CAPT Willard D. Michael, USN(Ret.)

# THE SOVIET SUBMARINE OPERATIONS IN THE BALTIC 1944-45 by Prof. Dr. Jürgen Rohwer

I n September 1944 negotiations between the Soviet Union and Finland led to a truce, demanding the evacuation of Finland by German troops. At the same time a big Soviet offensive against Estonia and Latvia forced the German Army Group North to evacuate both countries. When in early October the Soviet 1st Baltic Front broke through to the Baltic Coast near Polanga, the German troops to the north were enclosed in the Courland Bridgehead, to be supplied only over the sea. The Soviet High Command wanted to disrupt or sever the supply routes from the Western Baltic and the Bay of Danzig to Liepaja and Ventspils not only by their strengthened air forces but also by the use of submarines and torpedo cutters, while the bigger surface vessels were held back by Stalin's order to conserve these ships as training vessels for the new big high seas fleet program.

In 1943 and in the spring of 1944 the Germans and Finns had closed the exit to the open Baltic from the Gulf of Finland by big mine barriers from Narva Bay to the Finnish Coast at Kotka and by a combined mine- and net-barrier at the entrance to the Gulf.

Losses, transfers and lay-ups had reduced the Soviet Baltic Submarine Brigade from 66 units on 22 June 1941 to 19 boats in early 1944, notwithstanding the commissioning of 13 new boats from 1941-1944. The training of the available submarines, especially diving exercises, were greatly hampered by the icing of the Gulf of Finland from November to May and the fact that the area under Soviet control up to September was confined to the shallow area east of the mine barriers.

In August, before the truce with Finland was signed, the three remaining small submarines M-90, M-96 and M-102 were sent on short reconnaissances of the mine situation in the area of Suursaari, the Narva and the Luga Bays. On 7 September M-96 and M-102 again left Kronshtadt for a reconnaissance of the mine situation, but M-96 (KL N.I. Kartashin) did not return and was lost on a mine on 10 September, while M-102 (K3R N.S. Leskov) returned after touching mine wires two times. [Editor's Note: Soviet ranks are denoted as follows: K2R: Kapitan Vtorogo Ranga—Captain 2nd Rank; K3R: Kapitan Pevogo Ranga—Captain 3rd Rank; KL: Kapitan Leytenant—Captain Lieutenant.] In the truce agreements the Finnish Navy was forced to provide the Soviets with secure routes along the rocky islands off the Finnish Coast under Finnish escort, and to cede to the Soviets base facilities at Helsinki, Hango and Turku.

On 20 September 10 submarines were ready for operations. On 26 September the first three, SC-310, SC-318 and SC-407, left Kronshtadt, pausing a short time at Helsinki, and then escorted by the Finnish gunboat KARJALA and the Soviet minesweeper T-215 reached the forward bases and departed for the first patrols. They were followed in a similar way on 1 October by the next four boats, D-2, L-3, S-13 and LEMBIT, and on 5 October by the last three, SC-307, SC-309 and S-4.

The Command of the Baltic Fleet had established 10 patrol areas, to be occupied by one submarine each:

 East of Stockholm and south of the Aaland Islands: SC-307 (KL M.S. Kalinin)

2. West of Oesel and the Irben Strait: SC-309 (K3R N.A. Filov)

 From Ventspils to the south of Liepaja: SC-318 (K3R L.A. Loshkarev)

4. From Klaipeda to Brüsterort: SC-407 (K3R P.I. Bocharov)

5. The Danzig Bay: S-13 (K3R A.I. Marinesko)

6. The area of the Stolpe Bank: S-4 (K3R A.A. Klyushkin)

 The area between Kolberg and Bornholm: LEMBIT (K3R A.M. Matiyasevich)

8. The area west of Bornholm: L-3 (K3R V.K. Konovalov)

9. The area east of Karlskrona and Oeland: D-2 (K2R R.V. Lindenberg)

10. The area east of Gotland: SC-310 (KL S.N. Bogorad).

But the assigned sectors were changed very often according to the situation reports. During the first days of the operations in early October the Red Army accomplished its breakthrough to the coast near Polanga and it became most important to interrupt the German supply traffic to Klaipeda, Liepaja and Ventspils. The Soviets also had to attack the German surface ships—cruisers, destroyers and torpedo boats—supporting the German Army units on Oesel and the Sworbe peninsula and the troops near the coast.

So the first three attacks were made by SC-407 and SC-310 between 5 and 8 October off Klaipeda and the Irben Strait. SC- 310 sank the training vessel NORDSTERN and the towed dredger BAGGER 3, and SC-407 the transport RO 24/ZONNEWIJK. Off Hela S-13 missed the trawler SIEGFRIED with torpedoes but sank the ship by gunfire on 9 October, while L-3 and LEMBIT laid two mine barrages of 20 mines each north of Cape Arkona and northeast of Kolberg. It's very difficult to establish exactly the successes of the submarine laid mines, because since 1942 and especially in 1944 the RAF Bomber Command conducted a big mine offensive in the Baltic inside the 20 meters depth line, so that the Soviet submarines had to avoid these areas where the most used German sea routes laid.

It seems sure that on L-3's barrage at least the torpedo boat (small destroyer) T-34 sank and the sail trainingship ALBERT LEO SCHLAGETER was damaged. The other vessels claimed by Soviet historians after the war very probably really sank on British air laid mines in the mine areas *Geranium* in the Pomeranian Bay or *Spinach* off Rixhöft and Hela. That was where the tanker THALATTA, assessed to S-4, was damaged by an underwater detonation, while the trawler TAUNUS and the small tanker TERRA really sank at the times when S-4 claimed sinkings from 12 to 14 October.

Other attacks by submarines from 15 October to 10 November, when the last units of the first wave started to return to their bases, all missed and were only sometimes observed by German ships. The only exceptions are attacks by SC-309, which had to return on 21 October to Turku and departed under the new commanding officer, K3R P.P. Vetchinkin, again on 31 October for the area off Ventspils, where it sank on 10 November the German freighter CARL CORDS and on 7 December the freighter NORDENHAM. The first of the big submarines, K-56 (K3R I.P. Popov), had to return before reaching the assigned area.

With the transfer of the two new submarines, L-21 (K2R S.S. Mogilevskij) and K-52 (K3R I.V. Travkin), from Kronshtadt to Helsinki at the end of October the preparations for a second wave of operations started. They were followed by the new K-51 (K3R V.A. Drozdov), and K-53 (K3R D.K. Yaroshevich) from 11-25 November, the small M-90 (KL G.M. Yegorov) and M-102 (K3R N.S. Leskov) from 16-19 November and by SC-303 (KL Ye.A. Ignatev), operational again after big repair work, from 15 December. Meantime in October the submarine depot ships IRTYSH, SMOLNYJ and POLYARNAYA ZVEZDA were

transferred to the Finnish bases Helsinki, Hango and Turku, to supply and repair the submarines returning from their patrols.

On 9 November L-21 and K-52 departed, but K-52 had to return with damages after being depth charged in the Danzig Bay on 21 November. On 23 November L-21 laid 17 mines northwest of Rixhoft on which very probably the German freighters EICH-BERG and ELIE were damaged and EBERHARD sunk. In addition, L-21 on 24 November sank with a torpedo the trawler SPREEUFER. Next, on 23 and 24 November, K-51, K-53, and from the first wave again S-4, SC-407 and LEMBIT started. They were followed, after a short stop at Turku to replenish, by L-21 on 28 November, by SC-310 on the 1st, by D-2 on the 12th, and by K-56 on 17 December. But they all came too late to interfere with the operations of German cruisers and destroyers supporting the evacuation of the Sworbe peninsula from 18 to 24 November. Only the first wave's SC-309 was there on 21 November to attack the Task Group bombarding the advancing Soviet troops on Sworbe with the heavy cruiser PRINZ EUGEN, four destroyers and four torpedoboats-but the torpedoes missed.

K-51 on the way out southwest of Stockholm disposed of the small Swedish vessel HANSA by gunfire, but its many other attacks southeast of Bornholm remained unsuccessful. LEMBIT again laid a mine barrage off Brüsterort, leading probably to the loss of the steamer DIRSCHAU, the former Polish TCZEW, while the other ships, later claimed for this barrage were lost by other reasons. A torpedo attack on 11 December was not observed by the Germans. LEMBIT claimed to have sunk on 12 December in a collision near Utö a German U-boat, possibly the missing U-479. In a daring attack inside the Putziger Wik SC-407 torpedoed and sank the big liner SEEBURG, the former British ADELAIDE STAR, the loss of which was for a long time assigned to the British air mine field Spinach. The many other attacks reported in December by K-53, S-4, SC-310 and D-2 remained unsuccessful or were not observed. Only K-56 in the area of Bornholm on 25 and 29 December torpedoed the German freighter BAL-TENLAND and sank the Swedish VENERSBORG. The small M-90 and M-102 were sent at the end of December and in early January to the area of Uto to search for German U-boats, but had no sightings to report.

The German anti-submarine forces were relatively weak up to the end of 1944. The few destroyers and torpedoboats, as well as the fleet minesweepers, were mostly used to support the hard pressed army in the coastal areas and to provide A/S and A/A escort to the cruisers bombarding the positions of the Red Army. The vessels of the *Sicherungs-Divisionen*, mostly rebuilt fishing vessels, were mainly concerned with keeping the sea routes free of the British mines, and were badly equipped with A/S weapons. So only D-2 and K-52 were damaged by depth charge attacks, and on 4 January S-4 was sunk by depth charges of the torpedo boat T-3 off the Danzig Bay.

The commanding officers of the Soviet submarines overestimated their successes and especially the tonnage of the attacked ships greatly, probably because they lacked the necessary experience, as the table on the following page shows (the mine successes are omitted).

In January 1945 the situation on land changed rapidly. On 12 January the Soviet 1st Ukrainian Front broke out of it's Vistula bridgehead at Baranow, followed by strong attacks of the 3rd, 2nd and 1st White Russian Fronts on 13 and 14 January forcing breaks in the German lines. In a short time these offensives overran Poland, broke through to the coast west of Elbing and enclosed the area west of Danzig, Gdynia and Rixhöft. Big streams of refugees, running away from the advancing Red Army, converged to the remaining ports of East and West Prussia. The German Navy concentrated all available shipping from the big liners down to small coasters for the biggest evacuation operation in history. Interrupting this flow of ships running back and forth between the harbors in the eastern and western Baltic became a main task of the Soviet submarines along with their continuing operations against the supply traffic to Courland. But there were only a few submarines fit for operations after the return of most of the second wave. On 4 January SC-307 departed for the area off Liepaja, to be followed on 11 and 12 January by S-13, SC-407 and SC-318 to positions at the Stolpe Bank, the area of Rixhöft and the Danzig Bay, and off Pillau and Brüsterort. On 22 January K-51 was sent to the west of the Stolpe Bank and L-3 had to lay two new mine barrages of 10 mines each off Ventspils and off Brüsterort.

The claimed successes, besides a freighter HENRY LÜTGENS sunk on 29 January off Ventspils, are doubtful, because the positions of ships lost in the area off East Prussia by mines are not exactly known, and because the number of British air laid mines was so much greater—in January 668, in February 1354 and in

Submarine	Claimed		Established			
	Sunk	Damaged	Sinkings	Damaged	Days at Sea	
D-2	2/ 16000	-1-	-1-	4.	67	
K-51	2/ 14000	./.	1/ 563	4.	21	
K-52	1-	-1-	-1-	4-	18	
K-53	1/ 8000	-1-	-1 -	.1.	23	
K-56	3/ 24000	.1.	1/ 1044	1/ 3038	33	
ы	1/ 6000 1 escort	4.	-/ -	-1 -	45	
L-21	1/ 7000	4.	1/ 216	-/-	43	
LEMBIT	2/ 11000 1 escort	-/-	1/ 2414	-/ -	38	
M-90	4-	-/-	.1.	4.	11	
M-96	(Lost to mines 10 September 1944)					
M-102	4.	4 -	-1 -	-/ -	14	
5-4	3/ 26000	1/ 7	2/ 1751	-1-	60	
S-13	1/ 5000	4.	1/ 563	-1 -	40	
SC-303	-1-	4-	-1-	4-	19	
SC-307	6/ 39000	-1 +	-1-	4.	33	
SC-309	3/ 19000 1 escort	4.	2/ 5495	-1 -	63	
SC-310	6/ 38000 1 escort	4+	2/ 1527	·/ ·	63	
SC-318	1/ 10000	4.	1.	4.	51	
SC-407	2/ 24000	4.	2/16680	4.	39	
	34/247000 4 escorts	1/7	13/30253	1/3038	681	

Table 1 Soviet Submarine Results—September through December 1944

March 1198—that probably most of these ships were lost on RAF mines and not on the few Soviet submarine mines. In the first three months of 1945 there were probably 67 ships of 137,764 gross tons lost on these mines and 32 more ships damaged. Also many ships were sunk by attacks of the Soviet air forces and some also by Soviet torpedo cutters. Many German ships were saved probably because the Soviet submarines could not enter the areas inside the 20 meter depth line for fear of the British mines. And there most of the German ships were running, very often forced to stop at anchorages to wait for the completion of minesweeping operations. A submarine, for instance, may have had the possibility for a surface night attack against the anchorage off Swinemünde, not really covered by A/S vessels, and could have sunk several of the big liners or freighters waiting there.

Notwithstanding the fact that most of the German liners and big freighters transporting refugees from East Prussia escaped naval attack, three of the biggest shipping catastrophes in history were caused by Soviet submarines. S-13 on 30 January in a bold night attack hit the big liner WILHELM GUSTLOFF, running with a torpedoboat on the deep water route off the Stolpe Bank, with three of her torpedoes, causing her to sink fast. Of the 6288 people on board only 904 were rescued by the vessels called to help. A fortnight later, on 10 February, S-13 on a dark night attacked and sank a ship assumed to be a cruiser, but in reality it was the liner GENERAL STEUBEN, taking down 3608 people, while only about 300 could be saved by two small escorts. Even more catastrophic was the loss of the GOYA, to be described later. K-51 sank only the Danish freighter VIBORG off Rügenwa-Ide on 28 January. The relieving K-52 arriving in the area on 20 February, claimed four ships and two escorts sunk, but the only ship possibly sunk was BOHUS on 1 March.

On 16 January off Liepaja SC-307 probably hit the freighter STEINBURG, beached after a mine damage in a heavy storm before, and SC-318 on 4 February sank the small tanker HID-DENSEE. Other attacks by these boats and SC-407 and L-3 failed. Against the supply traffic to Courland and the redeployment of some divisions from Courland to East Prussia the Soviets sent in February M-90 and M-102 to Ventspils, and SC-309 to Liepaja where this boat on 23 February sank the transport GÖTTINGEN, causing about 500 losses, only to be heavily damaged by depth charges from the escorting minesweeper M-801. On 8 March the relieving SC-303 attacked a convoy, and sank the small steamer INKA but not the claimed transport BORBEK, sunk three days later by a Soviet torpedo bomber. The submarines M-90, SC-310, M-102 and D-2, relieving each other off Liepaja from March to May 1945, reported some attacks, but there is no evidence for a real sinking.

On 3 and 4 March again K-53 and L-21 departed for the area north of Kolberg and the Danzig Bay. On 17 March K-53 sank the steamer MARGARETHE CORDS, while L-21 on 13 March laid a successful mine barrage in the Hela Bay, on which the torpedoboats T-3 and T-4 and the U-boat U-367 sank in the next two days, while the destroyer Z-34 was damaged on 10 April. In addition, L-21 torpedoed and sank the patrol vessel V-2022/EMIL COLZMANN and the tug ERNI on 23 March. On 23 and 24 March, L-3 and LEMBIT started new minelayings northeast and northwest of Rixhöft. It is possible that on the first barrage the KRIEGSFISCHKUTTER M-3138, and on the second the transport NEUWERK and the KFK Vs-343 were lost, but these and also the other later claimed sinkings might have been caused by RAF air laid mines.

L-3 continued its patrol then in the area and on 16 April sank the refugee ship GOYA with torpedoes, causing the heaviest losses in a ship sinking in history. No less than 6666 people perished, only 334 were rescued.

On the night of 19 April, L-3 claimed the sinking of a transport of 8000 gross tons, later assumed to have been the gun carrier SAT 5/ROBERT MÜLLER 6. But according to witnesses this ship sank already in the afternoon of 18 April after hits by Soviet torpedo bombers. In April again K-56, K-52, SC-407, S-13 and K-53 were sent into the area between the Danzig Bay and the area north of Kolberg, but only K-56 on its way out sank the Swedish fishing cutter RAMONA by gunfire.

The claims and real sinkings by torpedo or gunfire amounted in 1945 up to 8 May to:

-	Claimed		Established		
Submarine	Sunk	Damaged	Sinkings	Damaged	Days st Sea
D-2	4-	4-	-J -	4.	18
L3	4/ 31000 2 escorta	-1 -	1/ 6267	4-	51
SC-303	1/ 7000	.1 -	1/ 427	-1-	29
SC-307	2/ 16000	-/ -	1/ 13197	.1.	30
SC-309	1/ 7000	-/ -	1/ 6257	4-	54
SC-310	2/ 12000	4.	-1-	-1-	34
SC-318	2/ 12000	4-	1/ 643	-1-	32
SC-407	1/ \$000	1 escort		4.	59
S-13	1/ 20000 1 cruiser	-1 -	2/40144	-1 -	53
L-21	3/ 21000	-/-	2/ 686	-1-	24
K-51	1/ 10000	-1 -	1/ 2028	-1 -	30
K-52	7/ 46000 2 escorta	4.	1/ 1761?	-1 -	38
к-53	1/ 6000	-1 -	1/ 1912	-1 -	38
K-56	1 cruiser 1 excort	.1.	-/- 1/ 57	4.	29
LEMBIT	-/- 1 escort	4.	-1-	-1 -	21
M-90	-/ -	4.	.1.	4.	24
M-102	-1 -	.1.	4.	4.	29
	26/196000 5 warships	-1-	13/61511	-/-	537

Table 2 Soviet Submarine Results-1945

If the Soviet successes are compared with the data collected by the Ostsee-Archiv Schön about the transport efforts alone in the evacuation of refugees, wounded and soldiers from Baltic ports in Finland, the Baltic States, East Prussia and Pomerania from September 1944 to May 1945 (omitting the neutral ships) great discrepancy is apparent: 409 German warships from cruisers down to *Marinefährprähme* and *KFKs* and 672 merchant ships from big liners down to coasters were engaged in one or more, sometimes up to 20 journeys. They transported 2,401,367 people. Of the 245 lost merchant ships, 130 sank after Soviet or RAF air attacks, 73 by mines, and only 20 of them were sunk by torpedo or gun attacks of Soviet submarines. 33,082 people lost their lives in these shipping losses, 16,728 of them by submarine attacks, most of them in the three big catastrophes.

The reason why the Soviet submarines achieved only marginal successes besides the three big sinkings, was at first the small number of available submarines, secondly the described training difficulties, but thirdly especially the necessity to avoid the British ground mine fields where the mostly used shipping routes laid. Even if there were some efforts to use results of the air reconnaissance, the submarines had difficulties to find their targets without radar. As the tables show, many of their attacks were tactical or technical failures, and the commanding officers overestimated the tonnage of the attacked ships greatly, leading the Soviet historians after the war to reduce the tonnage of not identified ships to an average of 2600 gross tons. Without exact knowledge about the British mine fields the Soviet historians also claimed almost any ship mentioned in German publications as lost to mines or unknown reasons in the eastern Baltic for the submarine mine fields, for instance the big liner BERLIN, which sank on three air ground mines on 31 January northeast of Swinemünde and not on LEMBIT's mines.

# **RUSSIAN SUBMARINE FORCES - 90 YEARS**

by I. Spassky and V. Semyonov

he interest of the Russian society in knowledge of the sea depths can be traced far into the historical past. No specific date marking the start of such interest can be indicated, although during the century and a half before 1900 more than 150 proposals related to the design of various types of submarines were submitted to the Naval Department and to royal persons. Among the authors of these projects were merchants and peasants, engineers and pupils from gymnasiums, cavalrymen and specialists in mechanics, landlords and officers, Russian people and foreigners. Several projects came even from faraway USA. There were several talented engineers and inventors among the authors: N.K. Shilder, I.F. Aleksandrovskiy, S.K. Dzhevetskiy. Fifty submarines accommodating one person and intended for fortress defense were even built according to S.K. Dzhevetskiy's design. But all the attempts to develop combat submarines could not bring any positive results in the 19th century because of two major reasons-there were no engines for underwater and surface running and no efficient underwater weapons.

The situation changed by the end of the 19th century-an internal combustion engine was invented, manufacturing of electric motors and batteries mastered, and torpedo production was organized.

France, USA, Italy and Germany appreciated submarines as a significant component of the state defense and might be even of attack, therefore a large number of engineers were involved in submarine design.

The most successful design works were carried by the firm of John Holland in USA (now it is Electric Boat Division of General Dynamics) which was ahead of other firms. When Chief Inspector on Shipbuilding of Russia, N. Kuteinikov visited USA, he discussed the possibility of building submarines for Russia by this firm. Feeling real interest from Russia, Holland's firm decided to sharply increase the price and the deal failed.

On due consideration of articles in American magazines and being confident in the experience of Russian shipbuilding engineers, the Marine Department on 19 December 1900 established a Commission for submarine design which included Senior Shipbuilding Assistant Ivan Grirorievich Bubnov, Senior Engineer-Mechanic Specialist Ivan Semyonovich Gorynov, and Lieutenant Mikhail Nikolaevich Beklemishev.

The Commission started its work in a separate secret room situated in the premises of the Model Test tank and on 3 May 1901 it produced the project of a *torpedo boat No. 113*. There was no submarine class registered in the Russian Navy as yet. The project was approved on July 5 and several days later Baltic Shipbuilding and Engine Works in St. Petersburg received the order for construction. I.G. Bubnov was assigned the Senior Builder of *torpedo boat No. 113*.

The submarine was developed based on the following assumptions:

- The principle of the least possible cost; proceeding from this the submarine displacement had to be minimal.
- The submarine surface speed had to be sufficient for attacking either passing ships or ships anchored or in motion at slow speed at the entrance to the harbor.

Working drawings had to be prepared by the Design Bureau of the Baltic Shipbuilding and Engine Works under the guidance of the Commission; later the bureau was transformed into the Underwater Department (*Podpla*). Having changed several names and undergone numerous transformations, this eldest underwater design bureau still exists. It is the Central Design Bureau for Marine Engineering *Rubin* according to which designs about 900 Russian submarines of various classes were built, from DELFIN to TYPHOON.

Company Putilovsky Zavod supplied sheet and profile steel, Obukhovsky steel making plant—air bottles, and major ship's equipment was manufactured by Baltic Works itself. The gasoline engine of Lutskoy's design was ordered from the firm Daimler where Lutskoy worked as chief engineer though he was Russian by origin. It was with his assistance that M.N. Beklemishev managed to visit one of the Holland submarines in USA. Storage batteries and the electric motor were ordered in France.

The riveted hull was of circular shape along its entire length. It was stiffened with 32 external frames and 8 internal stringers along the seams. External frames were made of two halves connected by forge welding strengthened with a riveted plate. No waterproof bulkheads and compartments were provided.

Externally, the pressure hull was coated with larch-tree boards,

a conning tower of cylindrical shape, provided with an access hatch and cover, was riveted in the midships area, and in the forward portion there was a rectangular hatch provided for storage battery and other equipment loading.

Main ballast tanks were located at the submarine extremities. The steering gear included one vertical rudder and three pairs of planes, middle planes being used for residual buoyancy elimination and were usually tilted to some constant angle. The armament was comprised of two external Dzhevetskiy drop-collar type torpedo tubes and two 1898 model torpedoes,

It was supposed that after the submarine trials, the possibility of increasing the number of Dzhevetskiy torpedo tubes to four was to be considered.

The first Russian combat submarine had the following tactical and technical parameters:

Length, m	19.6
Beam, m	3.35
Draft, m	2.9
Displacement, t (surfaced)	113
Displacement, t (submerged)	124
Reserve buoyancy, %	9
Propulsion, h.p. (surfaced)	1 x 300
Propulsion, h.p. (submerged)	1 x 120
Fulman's storage battery, cells (AH)	50 (3,600)
Fuel store for gasoline engines, kg	2,000
Speed, knots (surfaced)	10
Speed, knots (submerged)	5-6
Range, mile (surfaced)	243
Range, mile (submerged)	28
Diving depth, m	50
Armament (torpedo tubes) (Dzhevetskiy drop-collar type)	2
Torpedoes, model of 1898 caliber 380 mm	2

This submarine was launched in May 1903 and in October that year sea trials were accomplished. The date of final tests, October 14, 1903, is considered the date of birth of Russian submarine forces. The Commanding Officer of the submarine M.N. Beklemishev reported:

 The possibility for underwater run at 5 knot speed is provided with the accuracy of up to 1 foot.

 The surface speed of 8.5 knots can be increased by the installation of a propeller with adjustable blades.

 Practically, the range under electric motor was 60 miles at 5.2 knot speed and during four days meals were cooked, ventilation and lighting was provided.

 The possibility to charge batteries from the engine was checked several times in practice.

 Not only the crew but also several workers who worked on the submarine feel well during the sailing.

In March 1902, torpedo boat No. 113 was entered into the Navy lists as torpedo boat No. 150. Until March 1904, submarines in Russia were designated as torpedo boats. On 31 March 1904, all Russian submarines by His Highness's command were designated by names and torpedo boat No. 150 became at last submarine DELFIN.

Justice should be done to the thoroughness with which Beklemishev selected people for DELFIN's crew. He chose "persons with technical knowledge, of strong build, good behavior, non-smokers" and those who wished to serve on this submarine. Getting ahead of our story, we should do justice to Ivan Gregorievich Bubnov, the designer of 32 built submarines, 4 not completely constructed, and 10 planned for building submarines after the competition of 1916. He can be considered the chief or general designer of Russian submarine forces before the Revolution, and to Mikhail Nikolaevich Beklemishev, the educator of first generations of Russian submariners. The contribution of these two persons into the development of Russian submarine forces is really invaluable.

But let's return to the fate of submarine DELFIN. This first, and the only one till the Fall of 1904, Russian submarine became a school which taught officers and sailors who wished to serve at submarines.

On 16 June 1904, regular training took place at the western quay of Baltic Works. Lieutenant Cherkasov, who temporarily executed the role of the commanding officer, 2 officers and 33 sailors of the crew had to stay at the depth of 22 feet for three hours.

After the command "fill the tanks", the cover of the conning tower hatch was closed with some delay and water gushed into the submarine. One of the sailors in fright ran to the half-closed hatch trying to get out, got stuck in it and thus increased the water flow. An attempt to blow tanks did not result in surfacing as the submarine was almost completely flooded with water. Two officers and 10 sailors managed to open the hatch and swim out of the submarine. Lieutenant Cherkasov and 23 sailors perished. On June 19 a lifting crane was brought to the sunken submarine and it was raised. After repairs, on 15 November 1904 DELFIN was transferred to Vladivostok to participate in the Russo-Japan War. The first sail to sea (because of the delay with torpedo delivery) took place on 28 February 1905. DELFIN went several times to sea but did not meet Japanese ships.

On 5 May 1905 there was a serious emergency with DELFIN. It was required to open aft gasoline tank manholes in order to make some repair work for the vertical rudder. People were removed from the submarine and it was ventilated with portable fans. The ventilation continued during the following day under the supervision of two watchmen. An acquaintance of the watchman (a fellow villager) from a destroyer came to them and asked for permission to go around the submarine. The miner on watch and the fellow villager went down and after that there was an explosion; the heavily burned watchman managed to jump out of the submarine but his fellow villager remained inside the submarine. There was the second explosion and the submarine sank (later it was discovered that in the area of aft gasoline tanks 29 rivets of the pressure hull were drawn out). A probable cause of the explosion could be a spark from the switched-on breaker for lighting the submarine.

There was an explosion of detonating gas while the submarine was raised. The submarine was sunk awash, but during the subsequent attempts to raise it explosions occurred five more times. Finally, capital repairs were finished only at the end of 1905, i.e. after the conclusion of hostilities against Japan.

There was one more explosion in the submarine DELFIN on 9 December 1914 during charging the batteries from the transport ship KSENIA. The cause of the explosion was supposed to be a spark that appeared between a bulb and a socket when an electri-
cian touched the bulb with his cap.

Until May 1916 the submarine was with the submarine unit of the Siberian flotilla (this was the name of Russian marine forces in the Far East at that time).

In 1916, to defend the Kola peninsular, it was decided to organize in Aleksandrovsk (now Murmansk) a division of submarines for special purposes. This unit had to include submarine No. 1 and No. 2<sup>1</sup>, as well as DELFIN and ST. GEORGE.

On May 23 DELFIN was sent from Vladivostok to Vologda by railway. In Vologda it was reloaded to a barge and delivered to Arkhangelsk, from there it was towed to Aleksandrovsk.

On the night of 26 April 1917 DELFIN, which was moored close to submarine No. 1, was heavily damaged by a storm. The mooring lines were slackened, the service was careless, therefore due to blows against submarine No. 1, rudder glands became loose; submarine No. 1 sank and large amounts of water entered DELFIN.

Taking into account the technical condition of both the damaged submarines, Naval Staff on 8 August 1917 decided not to restore them and to transfer them to port authorities, the decision was fulfilled on August 10 that year.

Exactly 90 years after the first submarine joined the Russian fleet on 20 December 1993 in St. Petersburg, in the House of Scientists, an anniversary All-Russia, military and scientific conference, *Russlan Submarine Forces - Past, Present, Future*, was held where scientists, shipbuilders, naval officers and historians participated. They appraised at its true worth the role of submarine DELFIN in the development of the Russian submarine fleet and who did justice to the glorious 90 year history of submarine forces of Russia.

<sup>&</sup>lt;sup>1</sup> Small submarines No. 1, No. 2 and No. 3 built at Nevskiy Zavod according to 27-B design of the American firm Holland were intended for defending marine fortresses and until 1916 they were based in the Baltic Sea, in Rogekule. Submarines No. 1 and No. 2 were transferred to the North, and submarine No. 3 to the Danube.



General arrangement scheme of submarine DELFIN (reconstruction by Mr. N.N. Yefimov)

1-raile; 2-superstructure; 3-forward main ballast tank; 4-suptan of surface anchor; 5-forward trim tank; 6-control post of forward planes; 7-storage battery; 8-battery loading latch; 9-underwater anchor receas; 10-inner space of pressure bull; 11-periscope; 12-pressure house; 13-gasoline motor; 14- compressor and bilge pump with common sloctric drive; 15-transmission from motor to shaft; 16-propulsion electric motor; 17-elew coupling; 18-thrust bearing; 19-aft trim tank; 20-stern tube; 21-aft main ballast tank; 22vertical radder guard; 23-vertical radder; 24-propeller; 25-borizontal stabilizer; 26-aft planes; 27-pressure tanl; 28-middle planes; 29-forward planes.

# In the defense of our nation, there can be no second best.

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Newport News Shipbuilding 

#### A DISTORTED SUBMARINE

## by Nikolai Vorobjev Captain 1 Rank, Russian Navy(Ret.)

I thappened about 10 years ago. At the beginning of autumn in 1984, an alarming report was received from a new onepropeller Soviet VICTOR III class attack nuclear submarine which operated in the Pacific Ocean. The commanding officer reported that the submarine could not keep a certain depth when she was sailing underwater. On zero angle of the big horizontal stern planes the submarine was surfacing. To keep a depth she had to have a balancing angle of these planes of 8-9 degrees dive. Control of the submarine by her small stern horizontal planes, as it took place usually on high speeds, was completely impossible because of their insufficient effectiveness with zero angle of big stern horizontal planes.

It was known that approximately three years before an analogous phenomenon was observed on a submarine of this class. The efforts of specialists which studied it then had been directed to discover any possible hull form and appendage deviations from blueprints. But putting this submarine in a floating dock did not provide measurable results because the floating dock caved in. The cause of the phenomenon had not been cleared up.

After the submarine left the dock, balancing angles had become normal. The question had disappeared. An enigma stayed...

And now it was an analogous picture: big balancing angles of big stern horizontal planes. The fleet called the submarine *distorted* and she had been removed from regular service and fleet exercises.

To clarify the problem a special group of experts, with participation of the author of this article, had been established which directed tests of the submarine's maneuverability by determination of balancing parameters.

After providing neutral buoyancy and careful trimming without speed, the running of the submarine was analyzed in the range of speeds from 2 to 27 knots in the depths which eliminated any influence of the surface and the bottom. The submarine was controlled either manually or automatically by big stern horizontal planes. The planes' position was recorded every 10 seconds during 3 minutes of settled horizontal run, both from sensors of the automatic control systems and mechanical indicators of big stern horizontal planes' deflections. Furthermore, by means of a diver after sea trials, correspondence of planes' positions and mechanical indicators had been checked. The inspection of the underwater part of the submarine by divers did not show any damage or deviations of the hull's form and appendage shapes.

As a result, the sea trials established that an inherent submarine trim moment can be compensated only by deflection of big stern horizontal planes to 8-11 degrees of dive at all the speeds, or by pumping water from stern trim tank to bow trim tanks, providing dynamic trim of about 0.5 degrees. So the sea tests only defined more exactly the big stern horizontal planes' angles but they did not establish their cause. An enigma of the *distorted* submarine remained. Her normal service was impossible.

The commission concluded that the submarine had hydrodynamic asymmetry of the flow round her hull and appendages and recommended that the sub be measured once more, this time in a drydock. Some commission members assumed that *distortion* of the submarine had reached more than three feet on the whole of her length.

At the end of 1984 the submarine was put in such a dock. For measuring and analyzing the situation the most experienced experts were invited. The results of their measurements did not show any deviations from blueprints. What to do? To launch the submarine? And maybe it would happen again? The cause had not been determined! Why on high speeds does a sinking force up to 100 tons press on the stern?

In the process of discussing that problem, the author of this article proposed that the force appeared through differences in flow around the upper and lower surfaces of the stern horizontal stabilizers and planes. They are attached to the hull wings with an axis-symmetrical profile, they are trapezoidal in the horizontal planes with areas of 25 square meters on each side including horizontal planes.

He suggested that difference of the flow was stipulated by presence only on upper surfaces of acorn-like, horny-like (with sharp edges) foulage, with heights of 8-10 millimeters in amounts of 10-15 per square decimeter, and above them covered by green, soft slime-like seaweeds.

He also suggested that this roughness braked current on the upper surface, and he framed a hypothesis that in accordance with the well known Bernoulli's principle:

$$\rho \frac{v^2}{2} + p = const$$

(where v - speed and p - pressure) an increase in the speed of a fluid produces a decrease of pressure and a decrease in the speed produces an increase in pressure, the reduction of flow speed on the upper surface in comparison with the lower surface led to a big sinking force which resulted in unacceptable balancing angles.

But such an explanation did not get support from hydrodynamics. Because it was known in aerohydromechanics that increased roughness increases only force of resistance but does not induce an additional force directed normally toward the rough surface.

In the light of the fact that nobody suggested an alternative explanation, it was decided to clean the upper side of the stern horizontal surfaces from foulage. It was done in the drydock.

The following sea tests confirmed correctness of that decision: the balancing angles and trims of the submarine became normal.

So was discovered the enigma of the so-called *distorted* submarine. By the way, she *distorted* for a very simple reason: the upper surface of her horizontal planes and stabilizers had been painted, mistakenly, not by non-foulage but by usual paint. The similar situation took place on the previous submarine three years before.

Because of a defect in shipbuilding technology the author by chance was able to discover a new effect in aerohydromechanics.

It was negative for a submarine, but if to provide an increased roughness, for example, on the lower surface of a plane, it could be used for getting of additional lifting force.

Subsequent tests in the aerodynamics tubes of the Central Shipbuilding Krylov's Institute (Russia) of various planes with different roughness had proved that. The first result had been published by the author in the magazine <u>Soviet Physical Reports</u> (1991, vol. 36(51), pp. 373-376) and other magazines and had been patented.

Further study of this phenomenon showed that in addition to the considered case, it can be used in hydrofoils and hovercrafts. A case happened when a hydrofoil could not run on her properly working foil because of a viscous thin coating of cellulose on the upper side of the plane. It is reasonable to take into account this effect relating to surface ships. Sometimes their hulls get uneven fouling and it leads to significant balancing angles of their rudders.

It is possible to use that phenomenon in technology purposefully in designing of hydraulics, steam and gas turbines, propellers, turbopumps, ventilators, and torpedoes.

Even such candidates as cars and space shuttle ships can be

considered: the first ones-for increasing of the force which can press them down improving stability; the last ones-for increasing of the lift force by means of more burning of their lower side (growing roughness) when they are entering into more dense layers of atmosphere.

## THE SUBMARINE REVIEW

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

Articles for this publication will be accepted on any subject closely related to submarine matters. Their length should be a maximum of about 2500 words. The content of articles is of first importance in their selection for the REVIEW. Editing of articles for clarity may be necessary, since important ideas should be readily understood by the readers of the REVIEW.

A stipend of up to \$200.00 will be paid for each major article published. Annually, three articles are selected for special recognition and an honorarium of up to \$400.00 will be awarded to the authors. Articles accepted for publication in the REVIEW become the property of the Naval Submarine League. The views expressed by the authors are their own and are not to be construed to be those of the Naval Submarine League. In those instances where the NSL has taken and published an official position or view, specific reference to that fact will accompany the article.

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

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

## A BRIEF HISTORY OF THE USS REOUIN (SS 481) by Jim Mandelblatt

C ommissioned on 28 April 1945, the naval career of the submarine USS REQUIN (SS 481) began at 1130 that morning, when Captain Slade D. Cutter assumed command and officially accepted the submarine for the US Navy. Among an order of 80 TENCH Class submarines, REQUIN is one of only 25 boats built and one of only two surviving examples.

Arriving in Hawaii at the end of July, 1945, after an extensive period of training in the Panama Canal Zone, REOUIN carried the standard armament: two 5 inch/25 caliber wet-mount guns, two 40mm rapid fire cannons on the fore and aft cigarette decks, and ten torpedo tubes with 16 reloads, plus an experimental installation of two 24 tube 5 inch rocket launchers. She was just about to leave on her first war patrol when the war in the Pacific ended. With some crewmen upset that they were not getting combat pins and with a commander saying that those men should be glad to be alive, REOUIN returned to the United States a few weeks later and, upon her arrival there, was transferred to the Atlantic Fleet. The next few months were spent in routine training exercises, which consisted for the most part of providing target services for sonar school ships; "a dull and boring assignment" in the words of Slade Cutter. After completing this duty in the summer of 1946, REOUIN received a new commanding officer and a new mission.

## Life as a Radar Picket

REQUIN's conversion into a radar picket came about as a result of the Japanese tactics encountered during the later stages of World War II. Subjected to the increased and intensified kamikaze attacks against surface picket ships, most often destroyers able to warn the main fleets of incoming Japanese aircraft, the US Navy began to ponder the idea of using submarines. They would have to put enough radar on submarines to allow them to be able to control intercepting fighters, direct outbound aircraft, as well as providing warning for the fleet. According to Captain Jack MaGee, who served onboard REQUIN from 1951 to 1953, "the radar picket program grew out of a Pacific Fleet requirement to deploy submarines off Japan as radar pickets in the spring and summer of 1945." Although the war ended before fully equipped radar picket submarines could be deployed, the need for these vessels put pressure on the Navy to begin converting submarines to radar pickets.

The first two submarines subjected to this conversion were REQUIN and SPINAX (SS 489), with SPINAX being converted during her construction. The equipment used in these conversions was hastily adapted from surface ship units and as such, led to many problems. Chief among them was that with so much radar equipment aboard, the after spaces became even more confining. Another problem encountered was the fact that there was vast amounts of "short-circuiting of the antenna systems due to flooding."<sup>1</sup>

Together with the experience and results of the early radar installations onboard REQUIN and SPINAX, the Navy began the process of improving these installations in the Migraine program in 1948. The Migraine conversions were more extensive and the first submarine converted was TIGRONE (SS 419). TIGRONE (and later BURRFISH) had its crews' mess converted into an air control center, berthing moved to the stern room (which had its tubes removed), its batteries replaced by smaller, more powerful batteries adapted from the GUPPY program, and two forward torpedo tubes removed. Also, both submarines received snorkels to allow them to run their diesels underwater. The air search radar antenna was mounted on a pedestal on the after cigarette deck, the surface search radar antenna was placed on a pedestal about midway between the conning tower and the stern, and the fighter controller radar was located near the stern of the submarine.

The Migraine II conversions (REQUIN and SPINAX) were a bit more extensive. On REQUIN, the stern tubes were completely removed, with the forward part of the stern room being converted into an air control center and the after part being converted into berthing space. In addition, the bottom two torpedo tubes in the forward torpedo room were inactivated and sealed, being converted into storage space. The storage batteries were also replaced by improved Sargo batteries with greater capacity.

<sup>&</sup>lt;sup>1</sup> John D. Alden, Cmdr. USN (Ret.), <u>The Fleet Submarine in the US Navy</u>, Annapolis: Naval Institute Press (3rd Printing), 1988, p. 134.

Topside, in addition to receiving snorkels, the placement of the radar antennas was also different for the Migraine II boats. While keeping the SR-2 air search radar antenna on a pedestal on the after cigarette deck, the surface search radar (on REQUIN, the SV-2) was removed from its pedestal and placed on the deck, above the air control center. A fighter controller beacon (the YE-3) was also placed on REQUIN's deck, above the after engine room. Along with these modifications, REQUIN received a new designation in 1948 created for the radar pickets, SSR.

Even more extensive than the Migraine II conversions were the Migraine III conversions. Six GATO Class submarines were split in half between the control room and the forward battery

compartment and a 24 foot section was inserted which would provide adequate space for the air control center. The stern rooms on the six GATO Class boats were also converted to berthing space. Topside, the periscope shears, radar antenna mast, and snorkel mast were enclosed in a streamlined sail, rather than the open sails of the Migraine I and II boats.

After her conversion to a Migraine II configuration, REOUIN would spend the next 11 years operating as a radar picket, with its air control center operating in a manner similar to the combat information centers on larger vessels. Most of the time, REQUIN operated along the Atlantic coast, with some cruises to the Arctic (to test the radars' reaction to ice) and many cruises to the Mediterranean. On a typical operation, REQUIN would have four qualified watchstanders in her air control center; an aircraft controller, a height-finder operator, a plotter to plot all contacts reported, and a phone-talker to the bridge. A typical deployment would have REQUIN operating with another radar picket submarine (so that the other submarine could cover in case the primary picket had to submerge) "along the threat axis,"2 with REQUIN's distance from the main fleet being limited by its ability to communicate with the fleet. Being somewhat of a rare commodity, REQUIN spent more time at sea than other submarines usually did and was also subjected to more distrust than other submarines. On one picket mission in the Mediterranean, the commander of a combat air patrol (CAP) initially refused to be controlled by

<sup>&</sup>lt;sup>2</sup> Captain David H. Green, USN(Ret.), Commanding Officer of USS REQUIN from 1952 to 1954, letter to the author dated 15 May 1993, p. 1.

REQUIN because he thought the submarine would submerge in the middle of the intercept. In any event, the CAP commander was straightened out and the mission continued without a hitch.

REQUIN continued to provide valuable radar picketing services, even when the Navy began to phase out surface and subsurface based pickets. She operated as a radar picket until early 1959 when the Navy finally concluded the Migraine program and started to phase out the radar picket submarines.

#### 1959 to 1968

While many of her sister submarines were either being scrapped, mothballed, or sold to other navies, REQUIN received a new lease on life, due in part to her excellent condition. With the phasing out of the Migraine program, all of the radar equipment was removed from REQUIN and the open conning tower was replaced by a so-called high plastic sail (actually made of fiberglass).

With these modifications, REQUIN would continue to serve in the Atlantic fleet for the next nine years. Time, though, was beginning to run out for REQUIN. In the latter part of 1966, after REQUIN had returned from participating in UNITAS VII, a series of exercises with various South American navies, the Navy began to consider REQUIN's usefulness. Concluding that she was fast approaching the end of her service life, it was decided to decommission the submarine at the end of 1968. REQUIN's final deployment, coming in May 1968, lasted only a week and dealt mainly with the search for the missing nuclear attack submarine, USS SCORPION (SSN 589).

Decommissioned on 3 December 1968, REQUIN was later towed to Tampa, Florida to serve as a Naval Reserve trainer. She served in this capacity until 20 December 1971, when she was stricken from the Navy List. After that, custody of REQUIN was transferred to the City of Tampa in 1972, where it served as a memorial and a tourist attraction. Local interest and support for REQUIN remained fairly high for another 15 years. Due to a growing lack of attention and a scandal involving a one-time tour guide, the City of Tampa asked that the Navy take REQUIN away in 1989 (another reason was that the city wanted to improve its image for the 1991 Super Bowl and did not think that a World War II submarine fit that image).

#### Rebirth

It was at that time that the Carnegie Museum, in Pittsburgh, Pennsylvania asked the Navy about the possible donation of an obsolete ship to be placed on exhibit at its new science center being built on the banks of the Ohio River, next to Three Rivers Stadium. Hearing about the availability of REQUIN, the Carnegie contacted various local officials who had contacts in the Navy, and also the late Senator John Heinz (R-PA). Senator Heinz was able to get the necessary legislation through Congress in a relatively short amount of time which allowed the Navy's 60 day deliberation period (concerning the transfer of obsolete vessels for museum purposes) to be cut to three weeks. The legislation authorizing REQUIN's move was signed by President Bush in April of 1990.

This attempt at quick passage was necessary because of the timing and planning required by the predicted water levels along various stretches of the Mississippi through which REQUIN had to pass before arriving in Pittsburgh.

After necessary repairs, including the replacement of some outer hull plates, were completed in the Tampa Shipyard, RE-QUIN was moved to Baton Rouge, Louisiana where she would begin her journey up the Mississippi to Pittsburgh. Placed between four barges, REQUIN moved approximately 120 miles per day, arriving in Pittsburgh on 4 September 1990, where she was greeted by a parade of fire boats and small craft.

Opened for tours in October of 1990, USS REQUIN continues to be one of the most popular attractions today in Pittsburgh. Well supported by funding from the Carnegie Science Center, the attention REQUIN receives ensures a fitting memorial. Divers go into the Ohio River about every six months to inspect her hull, and her interior spaces are the subject of intense maintenance and restoration.

How popular is REQUIN in Pittsburgh? In the almost four years the submarine has been on display, about 400,000 people have toured the submarine. For more information on REQUIN, contact the Carnegie Science Center at the following address and telephone number: The Carnegie Science Center, One Allegheny Avenue, Pittsburgh, PA 15212, telephone (412) 237-3400.

## THE SAGA OF POGY (SSN 647) by Robert L. Huguenin, MMC(SS), USN USS SEA ROBIN (SS 407)

[Contributor's Note: Chief Petty Officer Robert Huguenin, MMC(SS) was serving on board the USS SEA ROBIN (SS 407) during an overhaul period in the Philadelphia Naval Shipyard in early 1968. He requested and was given permission to participate in the event described herein. As his Commanding Officer, I asked him to prepare an article describing the adventure. This was cheerfully done. Please enjoy a short 26 day sea-going tale as seen through the crusty eyes of an experienced top-performing submarine Machinist Mate.

Captain J. Denver McCune, USN (Ret.)]

he story you are about to read may seem a little far fetched during this day and age, but it's true all right.

This saga really starts on January 8th, 1968 when the towing crew of POGY, consisting of Lieutenant Victor P. Default (OIC), Robert L. Huguenin MMC(SS), George M. Papillard MM1(SS), John H. Ballard QM2(SS), David B. McCollum ETR2 and last but not least Terrence L. Howells EN3(SS) met together for the first time at Philadelphia Naval Shipyard. They were there to prepare USS POGY (SSN 647) for a tow of approximately 1800 miles from a berth at the Philadelphia Naval Shipyard, where she had laid idle from June until January, to a new constructing site at Ingalls Shipbuilding & Drydock Co., Pascagoula, Mississippi.

Preparing a ship like this (less than 50 percent complete) for a tow of that distance turns into a monumental task. Items that normally would be taken for granted on a submarine were not yet installed on POGY. There was no water, plumbing, or electrical systems, nor cooking or messing facilities, no berthing, no D.C. gear or emergency gear of any kind, and loose gear was adrift throughout the ship. All this had to be taken into consideration plus the fact of a tow past Cape Hatteras at the end of January, where weather could play havoc.

None of the men involved had ever been on a tow before, but all being good submarine men took to their new jobs with the typical naval *can-do* attitude and proceeded to get the job done. First of all, we had only seven full working days to get the numerous jobs done. Three emergency diesel generators had been lowered into the upper level of the Operations Compartment. Two 10kw and one 30kw generator would be supplying all the power needed for lighting, refrigeration, hot plate electric griddle, space heaters, signal light, running lights and submersible pumps.

The next problem was fuel to keep the generators running for the 10+ days required for the trip. This turned into quite a headache. Six hundred gallons of #2 fuel oil was pumped into #1 MBT. The flood ports on all ballast tanks had been welded shut. Fuel lines were tapped into the main vent cover plate with a line extended into the fuel itself, a pressure of 12 psi was then put into the tank to provide the push to supply the fuel for our engines. The system was pressure tested and all leaks located and prepared one day prior to getting underway. The system was constructed so that it could be pressurized from below decks using installed nitrogen bottles. As an emergency back-up system, six 55 gallon drums were mounted topside and piped below decks.

A combination refrigeration/freezer was borrowed from the Reserve Fleet in Philadelphia and lowered into the upper level of Operations compartment to provide for the stowage of our food for the trip. (We intended to at least eat well). Our water problem was solved after much debate by buying 5 gallon poly bottles, with caps. These were set in the lower level of the Operations Compartment and filled with water. This gave us approximately 640 gallons of water, a little more than 10 gallons of water per man per day.

To solve our cooking problems we purchased a two-burner hot plate and an electric griddle (18" x 10"), three pots, a 30 cup electric coffee pot, 300 paper plates, 350 hot drinking cups, plastic knives, forks, and spoons. (Also in case we ran out of silverware we purchased 1/2 dozen stainless knives, forks and spoons). To determine what to bring in the line of food, we enlisted the aid of the submarine barracks chief cook (Robert Smith, CSCS(SS)). He prepared our menu and planned what we would need to make this trip. The food was then purchased at the base commissary.

For a sanitary tank we purchased one of Sears & Roebuck's portable toilets. Also from Sears & Roebuck we purchased four 9-mile range two-way radios (two for use by the sea-going tug and two were to be used on board POGY). Using the radios below decks we had to install an antenna. We did this by running a wire from the outer edge of our sail planes to the top of the sail then down through a stuffing tube and into the galley where we set up our communications center.

We installed our hot plate, coffee pot and grill in the galley. For our mess deck we scrounged up an old table and benches from Shop 17 and had them installed in the wardroom. For our head we installed our portable party pooper in the wardroom pantry. For berthing we scrounged up some old bunks and mattresses and had them installed in the crews mess hall (keeping everything centrally located kept our lighting down to a minimum). Emergency equipment was borrowed from USS SEA ROBIN (SS407) and the Reserve Fleet in Philadelphia and loaded aboard.

The morning of January 18th arrived bright, sunny and crisp and at 0945 we tossed off our lines and bid farewell to the many people who helped us prepare for our long trip south. The trip down the Delaware River, through the Delaware Bay and out into the Atlantic proved uneventful and we settled down to our routine tasks of keeping the portable generator running, checking the towing rig, eating and sleeping. The temperature on the lower level of the Operations Compartment at this time was a chilly We spent the first two days checking for loose gear, 41ºF. preparing for what we expected to be a rough ride as we passed Cape Hatteras. As it turned out, the day we were towed past the Cape was a beautiful day, warm with a slight breeze and unbelievably calm seas. We then busied ourselves with adding some new comforts. We installed a shower (to the delight of all hands). Of course all water had to be hand carried in 5 gallon jugs to our new haven. We heated the water by placing the water jugs between the hot running emergency generator for a few hours. As we drew further south, heating was no longer a problem, and now we had to find ways to cool the ship down. The seas having been as smooth as silk enabled us to open our hatch on the main deck and we now devised a way to secure our 30kw and one 10kw and run with just one 10kw set on lighting. When we were cooking, we ran a second 10kw set. This reduced our heat load enough to keep the boat cool and habitable.

It might be noted that one member of the towing crew has to be a good cook. The food eaten on a trip is the only morale booster available, so if you eat well, morale will remain high. The cook also has to be a willing worker. His job under these conditions is no easy one. All the water has to be poured out of a 5 gallon jug. Washing dishes after a meal turns into quite a job. All water has to be heated on the hot plate and there was no running water, hot or cold. In the galley we used anywhere from 25 to 30 gallons of water a day for cooking and washing pots and pans and dishes. With luck we were able to rig one of the deep sinks in the galley to drain into a sanitary tank or we would have had quite a job disposing of waste water from the galley.

The weather was so nice on the fifth day of our journey that we were able to go topside and sunbathe. After six days we discovered that no one had taken any lighter fluid for our lighters, so we made our own electric lighter using a battle lantern battery. It worked good! Our portable head provided us a source of amusement. On several occasions, while using this unique device, it collapsed, much to the delight of the non-users. Also our poly bags (used on the seat) were running short so we substituted our 5 gallon jugs and lined the southern U.S. Atlantic coast with some of the largest urine samples they have probably ever seen.

Seven days underway, just southeast of Cape Kennedy, Florida, our lives suddenly took on a new meaning. At 0300 on the morning of the 25th of January, the tow line parted and we were drifting free from our tug. The tow line parted on or near USS PAPAGO allowing approximately 1700 feet of 2" steel cable to drop into the sea. Our watch woke the remainder of the crew and all six of us dressed in our special deck shoes, life jackets and newly designed life lines (shoulder harness types) and rushed topside to be greeted by a cool breeze and even cooler water.

Turning on our signal light in an attempt to light up our bow on this dark night enabled us to see to receive our shot line. To our dismay we found that the light had been mounted too far aft on the top of the sail and could not illuminate the main deck forward of the sail. But even so, it was an asset in the dark night. The sea rolled up over the deck, soaking the entire crew, and working was hard at best. The new life lines, combined with our Randy Boat Shoes were a welcome combination and work progressed until, at last, after several attempts we finally had a 7" nylon line attached to POGY. By now it was daylight and we attempted to retrieve the 2" steel tow cable. All attempts at this failed. To make matters worse, the 7" line snapped and we were again cast free of PAPAGO.

After what seemed like days of hauling line in, hand over hand, on a slippery cold wet deck we finally managed to get another 7" line made fast to us. During this last attempt PAPAGO and the POGY kissed which resulted in the buckling of several frames on PAPAGO and she started taking on a small amount of water. A radio message was now sent out and two other tugs were dispatched to assist us. The USS KIOWA arrived on the scene at approximately 1530, later the SS CABLE (a civilian salvage ship) arrived, then the USS PAIUTE arrived. With all this help and talent we figured our problems would now be solved.

With PAPAGO damaged it was decided to link up to KIOWA so she could take us the rest of the way to Mississippi. We had now been towed close to shore just north of Cape Kennedy into shallow water. KIOWA moved into position to get a tow wire on us. (We were held at anchor by our 1700 feet of steel cable now dragging on the bottom). On her first pass, KIOWA shot wide of her mark and although we received her shot line and about 1000 feet of her messenger we were unable to drag in any more line and the line was released. KIOWA made another approach on us. On this approach she came in too close for the wind conditions and before we could get a line aboard she drifted into our bow and damaged her hull and bent some of the blades on her screw.

Now with two tugs out of the picture (as far as towing was concerned) a new approach to the problem was tried. USS PAIUTE moved into position forward of us and dropped both her anchors. This allowed her to drift down to within approximately 400 feet of our bow. Next, she lowered a rubber boat into the water with an outboard motor, and drove over to us with four men and equipment with their messenger and a snatch block. The seas at this time were running about 8 to 10 feet and on occasion were up to 20 to 25 feet. During this operation, darkness overtook us and to make matters worse the rubber boat came up under our ladder and was punctured and sunk. But not before we recovered all her gear and men.

It was now decided to wait until dawn to complete the hook-up. At first break of light a tired but determined crew mustered topside for a tough days work and by 1610 we were made fast to PAIUTE and after dropping our 1700 foot of steel cable to the bottom, we were underway again for Mississippi. At this time, PAPAGO and KIOWA were released to head for port for repairs. SS CABLE was to stay with us. It was a tired worn-out bunch that crawled into their bunks that night, but all were happy to know that we were now on our way again with a secure rig enroute to Mississippi. The next morning at approximately 0900 on 28 January (the day we were supposed to pull into Mississippi) under the watchful eyes of two members of the towing crew, PAIUTE made an unusual maneuver and ripped the bull nose right off the bow of POGY. The towing pad-eye at this time was still intact although weakened and bent at approximately a 30° angle. Radio contact was made with PAIUTE and this information was passed to them. The towing rig was now closely inspected by members of the POGY crew and the information relayed to the tug.

At approximately 0920 for some unknown reason, the tug again changed course. When the towing cable came taut the towing pad-eye ripped free of the deck taking practically everything on the bow, with all the junk that flew everywhere. The back-up rig that had been installed never seemed to slow anything down, and once again those familiar words echoed across the sea: "POGY is drifting free again!". Only this time we had nothing to tie to for a tow except our retractable cleats and those had never been designed for towing.

It was a disgusted crew that finally hauled in a new 7" nylon line and made it fast to our retractable cleats. A new radio message had been dispatched for more help and once again we headed for shallow water. We arrived in shallow water off the shores of Fort Pierce, Florida and PAIUTE dropped her hook and it was decided to wait for help to arrive and also daylight to work in. We settled down for an uneasy night of watching the 7" line and weather. After approximately 2 hours, the watch, making his rounds discovered that the 7" line was fraying badly and a radio message was sent to the tug informing them of the situation.

The tug sent over a team of men to appraise the situation. It was decided to get underway again and shift POGY around and send over a 5" line (they had no more 7" line aboard). After things settled down again it was decided to wait until dawn to commence our temporary hook-up for towing us into Cape Kennedy for a permanent rig that would get us to Mississippi. The next morning arrived and it seemed like lady luck was finally on our side. The weather had calmed down and we proceeded to rig POGY for our tow to the Cape some 65 miles north of us. It had been decided to use 2-1/4" anchor chain looped around the conning tower.

Work progressed well and with the aid of the five salvage vessels now in our group we completed our hook-up and tied to USS RECOVERY. At 1610 we were underway for Cape Kennedy. The following morning after an uneventful night we were gallantly towed into Cape Kennedy. By now it was a very tired, dirty looking and disgusted crew that was seen topside of what must have looked like a rusted and battered looking hulk come limping into port.

Luckily for us, an FBM was in port and like any sub crew, they treated us like kings. Oh, how wonderful those hot showers and clean clothes felt. At least we felt human again. By now we should have been in Mississippi but here we were, only half way there and we had to be repaired before we could again put to sea. This gave us a chance to gather up more supplies and relax for a couple of days. Finally after 5 days of round the clock work by welders and burners from Electric Boat, we were ready to cast off all lines and continue on our way for Mississippi. We left the Cape at approximately 1330 on 4 February. We bid farewells again and started on our last leg of what we hoped would be an uneventful tow the rest of the way to Mississippi. This time we were to be towed by USS RECOVERY (twin screw ship).

That night we lost our main supply oil line from #1 MBT (it had been washed away). We shifted to our emergency supply, our six 55 gallon drums in a rack topside. This lasted until noon the next day. When the seas picked up and a wave hit the oil drums and knocked three drums loose breaking the supply line. Oil was spilling out on deck. Being our only oil left, it was decided to send two men topside to salvage the three remaining oil drums. At this time waves were breaking over the ship's sail planes and footing on the main deck was at best extremely hazardous, but the remaining three drums had to be salvaged or we would have been without fuel for our diesels and therefore without lights. The job was accomplished without any injuries to any personnel and we rode out the remainder of the storm losing practically all of our gear topside and pushing in the forward part of the sail.

During the storm, a radio message was received by RECOV-ERY from Key West requesting we turn back and wait out the storm. However, it was requested by both from RECOVERY and POGY crew to ride it out - and ride it out, we did. We were glad we did, since now we could continue on to Mississippi and not lose any time. We finally arrived off the coast of Mississippi on 12 February, but due to strong wind and the coming of darkness it was decided to wait until daybreak to enter the narrow channel and up to the piers.

As luck would have it, we ran aground just south of buoy #18. With the aid of two tugs and RECOVERY, we were finally pulled free of the soft bottom and continued on to the piers, arriving at approximately 1810. Our intended 10 day trip was over after 26 days. The actual time spent under tow was 21 days. When we pulled alongside the pier, we had enough fuel remaining for approximately 16 more hours of running time. We had enough food and water for 4 or 5 more days. But our hot plate had only one burner working and it only worked on medium range. Our sonar dome was flooded, our port running light had shorted out, our signal light had burned out, and our ballast tank was leaking fuel oil. But we had made it!

It was a happy crew that tied up the lines and prepared to leave POGY for the shipyard to build into the finest fast attack nuclear powered submarine ever to sail the seven seas!



## TRAINING TECHNOLOGY - THE FORCE MULTIPLIER by LCDR Charles Church, USN Director Submarine On Board Training

A s the fleet decreases in size from 547 ships in 1990 to a projected 340 or fewer in 1999, the Navy will be called to do more with less. Fewer ships coupled with the requirement for swift short-notice crisis response means sailors must be trained and ready. Submariners have always been advocates of training. The hostile environment under the sea has required all hands to be knowledgeable of the whole ship, and the smaller crew has required each person to be able to perform a wider range of skills. This focus on training is increasingly shared by the entire Navy. In the future austere fiscal environment, where new system purchases will likely be deferred, the focus of operational system readiness must move to the human side of the equation, to better training and education.

Information technology may well be the most important technology in the future for the Submarine Force. This technology will change the nature of Navy education and training over the next 5 to 15 years. Some future applications of information technology are the interactive computer based courseware using virtual environments, interactive electronic technical manual, and the Distributed Interactive Simulation (DIS) program.

During 1993, the TRIDENT submarines were issued a training system which combines a computer with a video disc player that allows video and computer software to be integrated. TRIDENT courseware consists of 34 modules with 44 interactive lessons on 30 laser discs. Each lesson represents an individual subject area as defined by enlisted requirements for submarine qualification. The courseware has become a vital part of both junior officer training and the enlisted submarine qualification program.

Another program using computer technology is the Tomahawk Interactive Learning Center which teaches loading, handling, physical and operational characteristics, employment and maintenance of cruise missiles using full motion video to enhance understanding and sustain interest. Sailors have found the system easy to operate and the software provided to be educational and entertaining. Future advances in computer hardware and software will determine the sophistication of computer based training and tactical computer systems.

The SEAWOLF and the New Attack Submarine will benefit tremendously from advances in information technology. Training for SEAWOLF will not follow traditional lines of emphasis on formal school house training, largely due to the small number of ships to be built. There will be fewer formal courses; some subjects that would normally be covered in C School courses will be taught as on board training, either as videotapes, self study books or interactive courseware. SEAWOLF will not have a unique shore-based attack center nor any shore-based submarine piloting and navigation trainer.

Instead, a robust on board training capability is being built into the AN/BSY-2 combat control/acoustic set, and training capabilities will be embedded in the radar and other tactical equipment. The SEAWOLF training philosophy is that the ship, when properly supported, presents the most effective training site for appropriate operational and functional training. This allows ships to train using their own equipment and system configurations. Watchstation training and ship's qualifications will be enhanced by on board training packages. These training packages will prevent excess time and energy being spent in the preparation of lesson plans and training aids. This allows more effective training for new personnel and makes refresher training easier and more effective.

Shifting portions of maintenance training, especially preventive and perishable skill maintenance, to shipboard can be achieved through the use of Interactive Electronic Technical Manuals (IETM). Advanced software is already available for hypermedia, intelligent databases access and help systems. Training and maintenance will be merged into one median. USS AUGUSTA's new Wide Aperture Array is being delivered with an IETM. The IETM can provide just in time training to the sailor. Integrated maintenance and training information is available to the operator at the push of a button. This application of information technology definitely has dual use in the civilian sector.

Virtual environments that allow the individual to feel a part of the computer simulation will dramatically improve the realism of training. Work in the area of synthetic environments will lead to more interactive higher-fidelity simulation systems for training complex skills. This virtual reality approach has been evaluated by Newport News Shipbuilding Company and shown to significantly increase task knowledge and skills within a short time, especially for those with little or no previous experience. Virtual reality can be applied to hazardous work environments such as fire fighting or maintenance in a toxic environment to enhance training while minimizing the danger to the trainees.

The Advanced Technical Information System (ATIS) network is being installed on USS NEWPORT NEWS. The technical manuals have been digitized and placed on CD-ROMs. The CD-ROMs will be housed in a CD-ROM multichanger which is like a *juke box*. This system will hold up to 480 CD-ROMs which will be networked and accessed throughout the ship. The ATIS program is exploring the use of interactive training materials which will be used in conjunction with technical manuals. Besides reducing the storage requirement of these publications, it will allow the sailor to prepare *paperless job packages* with the needed training embedded in the work package.

President Clinton's vision for the future includes an *information* superhighway. Video teleconferencing is an example of how the Navy can ride the superhighway. The CNO Video Teleconferencing system is being expanded to major command ships. Also, battle groups currently deploy with a PC-based conferencing system that employs interactive voice, video and data transfer. Vice Admiral Jerry O. Tuttle stated, "This system proved its value when USS SARATOGA was able to transit timely images directly to the Pentagon following the accidental firing of NATO Sea Sparrow missiles upon a Turkish ship." In the future, submarines may be able to receive operational and training packages while deployed.

Another application which will use the information superhighway is the DIS mentioned earlier. The DIS program is developing synthetic environments and standard networking protocols for multi-unit air-land-sea battle training. The Navy has initiated two programs which will use this technology. This technology will allow ships, planes, and submarines the ability to fight simulated wars at sea or in-port. The Tactical Combat Training System, which is sponsored by NAVAIR will be used at sea; the in-port version is Battle Force Tactical Trainer, which is sponsored by NAVSEA 06.

The goal of both programs is to provide realistic training at the battle group, tactical group, and single platform levels. The most important benefit of these systems is that they will allow the sailors to train with their own equipment during exercises and then to replay and get instant feedback on their group and individual unit's performance. Training realism will be enhanced by the mix of real and simulated platforms. The Submarine Force will be an integral player in both of these training systems.

The Submarine Force needs to leverage this technological infrastructure by maximizing the training potential for today's sailor. The ability to successfully employ weapons is not only a technology issued but also is dependent upon our ability to use this technology. Today's computer-based and video-based training systems already perform at least as well as conventional training methods. Using information technology, weapons training will truly be the force's multiplier.

## THE NUCLEAR ARROW BELONGS IN THE U.S. OUIVER

by VADM J. Guy Reynolds, USN(Ret.) Progress made and promised in the reduction of nuclear weapons is encouraging. The time when our existence as a nation could be held at risk may soon be behind us. Only nuclear weapons in the number available to the remnants of the

former Soviet Union require a strategy dependent on mutually assured destruction (MAD).

Nuclear deterrence worked! Those awesome weapons in silos, in the belly of bombers on strip alert and roaming the seas in nuclear submarines, coupled with the clear understanding that we had the determination to use them, held the formidable destructive powers of the Soviet Union in check. From Korea to Vietnam to Iraq, president after president exercised appropriate restraint even when faced with difficult national security situations that involved the risk of large numbers of U.S. casualties.

With the prospect of nuclear destruction of the American homeland diminishing, some consider complete elimination of the United Sates as a nuclear power to be the next sensible step. "Sophisticated advanced conventional weapons can defeat any Third World leader," has become the commonly heard refrain. It is conceivable that the dedication of sufficient resources, money, equipment, and life, can bring down any despot. The question that must be answered is the acceptability of the employment of nuclear weapons by a renegade without the constraining value realized by the threat of commensurate retaliatory action.

The deterrent significance of nuclear weapons has been proven for half a century. The value of the United States' nuclear arsenal has been in the guarded control by responsible leadership rather than through actual utilization. The same level of restraint cannot be assumed of regional powers armed with weapons of mass destruction (WMD). Proliferation of WMD continues at an alarming rate. We have witnessed the limited use of WMD in the Iran/Iraq war. Much of the world looks to the United States to provide an environment that accommodates their quest for economical stability and growing democracy. Elimination of our nuclear capability, combined with our long-standing aversion to placing people at risk, could encourage potential aggressors to test our democratic and humanitarian resolve. A situation would be created where they could take holocaust-like action realizing that the response of the world community would be limited to the dedication and loss of human resources on par with world wars of the past. Our National Command Authority should have every option available to deter rouge action. Those options should span diplomatic warning, sanctions, isolation and intervention, to permanent resolution without excessive loss of U.S. life.

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As we celebrate our 25th anniversary this year, we would like to recognize the significant role the Submarine Force and its Naval Submarine League have played in the history of steady growth of Analysis & Technology, Inc.

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## COMMENT ON DEFENSIVE ANTI-AIR WARFARE FOR SSNs by Ambassador Linton F. Brooks U.S. Chief START Negotiator

In his January 1994 SUBMARINE REVIEW article Defensive Anti-Air Warfare for SSNs, Jim Patton provides an elegant description of how technology could be applied to solve the airborne threat to attack submarines. If the Navy had ever actually had to execute the Maritime Strategy of the 1980s, with its emphasis on attacking submarines within protected bastions, such an AAW capability might have been extremely valuable. Soviet protection of ballistic missile submarines in home waters relied, in part, on air cover; while Soviet airborne ASW was not a huge threat to attack submarines, there is no inherent reason for that limitation to be permanent. In the forward ASW world of the Maritime Strategy, an SSN AAW capability made sense.

Unfortunately, given the end of the Cold War, the proposal is a technology cure for which there is no longer any known disease. If ...From the Sea really does represent the future, it is difficult to see a need for such a system. This is not because there is no role for submarines in littoral warfare. On the contrary, the CSIS study, <u>Attack Submarines in the Post-Cold War Era</u>, summarized in the same issue of THE SUBMARINE REVIEW, clearly documents that the stealthiness and multi-mission flexibility of nuclear attack submarines ensures them an important role in a defense planning environment characterized by uncertainty and built around regional conflict.

That role is, however, unlikely to expose submarines to airborne ASW attack. In littoral warfare, the first and most important characteristic of attack submarines is stealth. Whether conducting covert intelligence gathering, covert strike, or covert insertion of special warfare forces, the submarine must remain undetected. If a situation arises where AAW defense comes into play, the submarine has already failed. Fortunately, prospective targets for littoral warfare are not likely to be able to detect a submarine that wants to remain undetected. While Tomahawk launches could, in theory, provide a datum, such launches normally take place well off shore and thus offer limited opportunities for detection.

Even after overt hostilities begin, there should be little need for submarine-based AAW. It is virtually certain that the United States will have control of the littoral air space in such operations, precluding effective airborne ASW directed against U.S. submarines. In short, either submarines will remain covert and undetected or the United States will have control of the air. As a result, it seems doubtful that SSN AAW will be crucial for executing the missions envisioned by <u>...From the Sea</u>. At a time of drastic reductions in submarine force levels and of serious debate about the future of attack submarines, adding nice-to-have features such as SSN AAW is simply not warranted.

The fact that there is no current need for submarine-based AAW does not, however, mean that there never will be. The new post-SEAWOLF attack submarine will still be in service 40 years hence. Who knows what our defense needs will be in 2035? Forty years ago the Korean war had just ended. Defense planning was dominated by fears of a confrontation with international communism leading to a global nuclear war in which nuclear weapons would be used more or less like any other weapon. Ahead lay insurgency, counterinsurgency, the concepts of nuclear deterrence, the strategic Triad, the loss of energy independence and consequent importance of Middle East oil, the information processing revolution, the nuclear submarine, and a host of other factors—some foreseen, some not—that have shaped today's defense environment. Given this history, only a fool would claim to be certain of future defense needs.

The best course would appear to be to design the new, 21st century attack submarine to make future backfits and updates of the weapons system as easy and cheap as possible. Such an approach would be analogous to that used with the design of the SPRUANCE destroyer, where the basic hull and propulsion plant has been continually adapted to new weapons. While we may not be able to afford the full modular approach suggested by Bill Houley in his October 1993 <u>Proceedings</u> article, 2015, such a modular design should be our goal.

Adapting submarine design to emerging requirements is nothing new, of course. Neither a requirement for Arctic operations nor vertical launch of cruise missiles figured in the initial LOS ANGELES design. What is important, however, is to recognize that, at the same time basic hull designs must endure longer and longer, world conditions are changing more and more rapidly and unpredictably. Design flexibility to adapt to future requirements—including as-yet undefined requirements for AAW—should be an integral part of future submarine construction.

## COMBAT SYSTEM COMMONALITY, AND OBSOLETE EOUIPMENT REPLACEMENT by Al Dadd

[Editor's Note: Mr. Dadd graduated from Miami University in Oxford, Ohio and was commissioned in 1966. He left active duty after 10 years as a Naval Aviator and since then has been involved in work on various submarine issues. He is presently with American Systems Corporation in the Washington area.]

hen an SSN was sawed in half to add a missile section and create the first SSBN, true combat system commonality was a reality. Although attempts have been made to achieve commonality among the systems installed in attack and strategic submarines, things have been going downhill ever since.

With crystal clear hindsight, the decision to develop the SSN 688 BQQ-5/Mk 117 and the SSBN 726 BQQ-6/Mk 118 systems was a mistake. Few (at least now) disagree that commonality is a good thing. It ranks near motherhood and apple pie. How to achieve it is what causes disagreement.

The latest commonality effort is the AN/BQQ-5E sonar and combat control system (CCS) Mk 2 fire control, known as QE2. QE2 was to be installed in all SSN 688, SSN 6881 and SSBN 726 class submarines. Due to new fiscal constraints, QE2 may only be installed in four SSBN 726 class and 12 SSN 688 class submarines. This would represent a regression vice an improvement by increasing the number of submarine combat weapon system (CWS) baselines. The problem is illustrated by the diagram on the following page.

Absent a complete QE2 program, an obsolete equipment replacement (OER) program will be required for the sonar and fire control subsystems in the remaining SSN 688, SSN 6881 and SSBN 726 class submarines. AN OER program is presently needed for the antenna, periscope, monitoring, data processing, navigation, etc., subsystems in these classes.

The submarine community is currently faced with several financially competing efforts. These include:

Finishing the development of the AN/BSY-2 system

- Conducting the limited QE2 installations
- Developing a system for the new SSN (NSSN)
- Upgrading AN/BSY-1 with QE2 functionality (AN/BSY-1 ECP 1000)
- Supporting approximately 50 submarines filled with equipment whose technology is entering its third decade
- Conducting an OER program for the sonar, fire control and other CWS subsystems for the SSN 688, SSN 6881 and SSBN 726 classes.



Since revolutionary attempts at achieving commonality have been counter-productive, it is time to try something different. Fleet support, the baseline explosion and today's budgets all call for small, affordable, mini-solutions. Achieving incremental, evolutionary progress towards commonality from the bottom up, one piece of equipment at a time, deserves a chance. It is affordable. It supports the fleet by replacing diverse, obsolete equipment with common modernizations. It will not replace entire baselines, but it will create a convergence of existing baselines vice spawning additional baselines to support.

One step toward affordability is to combine and consolidate as many of the above listed six efforts as possible. Commonality is virtually synonymous with the consolidation of equivalent and/or overlapping development, upgrade and modernization efforts. True commonality covers all equipment, subsystems, systems and classes to offer the only affordable solution in today's budgetary climate. The incremental implementation of commonality avoids excessive funding requirements in any period.

It is also important to take advantage of inexpensively available non-development items (NDI). Neither the Navy nor the submarine community can afford to develop items which already exist and are available from other sources. These other sources (NDI) include commercial off-the-shelf (COTS), ruggedized off-the-shelf (ROTS) and government off-the-shelf (GOTS), including full Mil-Qual GOTS.

To successfully implement the necessary efforts in an affordable manner, excess militarization will have to be avoided and certain proprietary attitudes abandoned. There are several policies which are recommended:

- Designate NDI as the preferred source for all products
- Maximize the use of COTS or modified COTS where acceptable and cost effective
- Maximize commonality across all classes, systems, subsystems and equipment for all future developments, modernizations and/or obsolete equipment replacements
- Minimize standalone development, modernization or obsolete equipment replacement efforts for any equipment if equivalent equipment exists elsewhere.

To affordably implement the required efforts, the Navy should complete the major, ongoing efforts. The BQQ-5E/CCS Mk2 shipsets that have been acquired should be installed and development of the SEAWOLF CWS should be completed.

An integrated approach, based on obsolete equipment replacement, can be used to implement the remaining efforts which are currently in financial competition. First, the detailed OER requirements for all classes have to be determined. That is not an insignificant task because it requires matching of the reliability, maintainability and availability data with individual equipments in the various systems to determine the consumption rate for specific piece parts. From that, the correlation between individual class OER requirements can be determined. Once the CWS for the NSSN is defined, and its development, based on the use of NDI, is started, the OER requirements for the other classes can be defined in terms of migration toward the NSSN system.

This approach has the benefit of providing the modernization and obsolete equipment replacement items for the existing classes as part of the effort required for the NSSN. In that way the holes can be filled that are left by the curtailment of the QE2 program and upgrade the AN/BSY-1 systems. Such an integrated program will reduce overall development costs by eliminating the need for parallel development efforts for each class, and allow those costs to be amortized over all existing submarines as well as the NSSN. In addition, incrementally increasing total commonality across all classes, systems, and equipments will reduce life cycle costs by eliminating and/or difficult to support equipment. Over time, the number of unique configuration items requiring support will be reduced.

In attempting to ensure that NSSN equipment can be common with OHIO and LOS ANGELES Class submarines, the new design features of DC power distribution, modular integrated deck structures, and maximized use of COTS equipment, will have to accommodated. Each of those can cause compatibility problems, but none of them are insurmountable or provide reason not to strive for cross-class commonality.

In order to use COTS or other AC powered equipment, NSSN will have to convert the distributed DC power to AC before it is fed to the equipment. This approach is in consonance with existing classes.

Existing standard circuit card and chassis dimensions should be used for any new equipment and for the NSSN modular structures. This will allow the new equipment racks and chassis to be installed in the modular structures for NSSN and mounted in the cabinets of the equipment which they replace in existing classes.

Because the missions of the NSSN and the existing classes are quite similar, the approach to mission criticality being pursued for the NSSN would not need to be modified significantly to address the other classes. Cross-class decisions could be developed for mission criticality, militarization requirements and equipment testing requirements. This would support the introduction of COTS into existing classes for the same functions that will be implemented with COTS for the NSSN.

## THEY LEAVE AS THE BEST

by CAPT Russell A. Pickett, USN Commanding Officer Submarine Training Facility Charleston, SC

There is no question in my mind that when our young sailors leave boot camp they are the most motivated and patriotic young Americans in our country. Recently, on the spur of the moment, I went boot camp graduation at RTC, Orlando. I had never been to one before. I was surprised at how moved I was by the end of the ceremony. In a brief eight weeks, our skilled and dedicated Recruit Company Commanders had transformed these young people from civilians, knowing, in most cases, little about the Navy, into sailors. From the recruit Drill Team, to the Recruit Chorus, to the Recruit 50 state Flag Team, to those that were just sailors in ranks, the pride and sense of accomplishment felt by these young people and the thousands of parents and friends that filled the stands was overpowering. I don't think I have ever been so proud of a group of people in my life—and I didn't know anyone that was graduating.

So what's new? We have been graduating boots for years. All probably left boot camp feeling the same way—ready to join the fleet and serve their country. Why were these recruits different? Recently at a flag level meeting the Navy discovered that we had never really defined what a *sailor* is. Think about it. If you walk up to a member of the Air Force, Army, and Marines and ask him or her what they are, they will likely say that they are an Airman, Soldier, or undoubtedly a Marine. It you ask a member of the Navy you will likely be told "I'm a Machinist's Mate or Sonarman or Quartermaster". Few will say that they are a *sailor* though all are proud of being one. The other services had defined what their people were. We had not. The Recruit trainers have fixed the problem.

Recruit Training has a clear mission. It "begins the transition from civilian to Navy life, focusing on fundamental skills/knowledge and one the military socialization process. The objective is to develop sailors who are motivated, willing to learn, proud to serve and confident to perform basic seamanship skills, and whose behavior is consistent with the standards and values of the United States Navy". Other changes have been made such as drilling with and firing M14s vice non-functioning dummy weapons. Increased emphasis on physical training and military drill. Increased emphasis on seamanship skills such as firefighting, damage control, abandon ship procedures and survival at sea. The recruits now sleep on shipboard style bunks again enforcing the fact that they will soon be sailors.

Do these changes improve the product? Only the fleet can say for sure. But let's go back to the graduation ceremony. The final event is something special. It was led by the RTC Command Master Chief. All recruits participated in unison. It clearly summarizes what they have become:

"I am a United States sailor.

I will support and defend the Constitution of the United States of America and I will obey the orders of my superiors.

1 represent the fighting spirit of Navy Bluejackets who have gone before me to defend freedom and democracy around the world.

I proudly serve my country's Navy combat team with honor, commitment and courage.

I am committed to excellence and the fair treatment of all."

Maybe this is why we are the greatest Navy in the world.

## WAHOO MONUMENT

The town of Lewisville, Minnesota, will dedicate a memorial to WAHOO and "Mush" Morton on October 8, 1994. Members of Commander Morton's family are trying to locate surviving family members of the crew so that they can be invited to the dedication. Information on any surviving family members may be passed to The Haycrafts, P.O. Box 193, Lewisville, MN 56060.

## HOW THE LAMINATED BATTERY JAR REALLY ORIGINATED by CDR John D. Alden, USN(Ret.)

This story is quoted (with some minor editing) from an interview with the late Rear Admiral Armand M. Morgan, who was Head, Submarine Design and Construction in the Bureau of Ships from April 1938 to February 1945. The incident described here occurred earlier, while he was in the Production Department at Portsmouth Navy Yard. The Navy was in the process of shifting from riveting to welding and had directed Portsmouth to build test caissons to see how well each process would withstand explosive charges.

"These tests brought out many other valuable features, and the test continued. We built a double hull (model) and began putting things into it for testing. ...We'd pick up things around the yard on our own initiative and put them in the caisson and ... see what happened to them.

"A Lieutenant (Marshall M.) Dana-Heavy Dana they called him-came up one day and said 'I want to put a storage battery cell in there.' We searched around and couldn't find a cell but we found a jar, so we filled the jar with water and put it in the caisson, and boom, the jar busted. So this led to great interest. We got the Bureau to send us up a full cell, and that was quite an adventure because money was scarce in those days and one battery cell was an expensive item, and we put a first class battery cell, brand new, in the caisson for the next test and the jar again broke. This is what brought about the laminated jar. Talk about outstanding features of our submarines, you cannot ignore this, because a large percentage of the German submarines were lost because of battery failure, and as far as I know, we didn't have a one....

"The first jar that we worked up to cure this was a steel jar lined with hard rubber...steel between two pieces of hard rubber-and this hit pretty hard on weight. ...Bud (Lieutenant Elmer E.) Yeomans got a brilliant idea of substituting for the membrane of steel a membrane of soft rubber like that used for condoms, and we gave that a try in the caisson and it worked just as well as the steel. The jar might break but nothing would spill. There'd be no shorts. So this battery jar of ours was without doubt the finest in the world and I think was a major factor in the survival of our submarines."

So now it can be told-the condom helped save our submarines in World War II!

## NSL JOB NETWORKING

The following Naval Submarine League members are willing to help submariners who are transitioning from active duty to civilian life. Please feel free to contact any of them for assistance or advice in making your important career change.

Name	Company/Specialty	Phone
Jim Adkins	US Enrichment Corp/Uranium Fuel Enrichment	301 564-3417(W)
John Asher	Global Assoc. Ltd/Engineering Consulting, Warfare Analysis	703 351-5660(W)
Bob Avery	ADI Technology/NAVSEA Engineering Tech Services	703 892-2740(W)
Dave Balding	Landstar Systems/Motor Freight, Transportation & Logistics Svcs	703 912-6808(W)
Tim Besdy	SAIC/Professional Svca, Arma Control Treaty Mgmt, Training	703 749-8659(W)
Dave Cooper	ESL/Defense & Intelligence Systema	703 648-0122(W)
Ed Conant	Electric Boat/Submarine Design & Construction	703 412-1814(W)
Ken Cox	Cortana/International Submarine Technology	703 534-8000(W)
Jay DeLosch	Defense Nuclear Facilities Safety Board/Engineer, NPEB Exprace	202 208-6580(W) 806 477-4894(5)
John Fox	Endmark Corp/Combat Systems Eng. Computer Systems Dev	703 414-5570(W)
Hank Fishel	User Technology Assoc /Comput- er Network & System Design	703 418-6426(W)
Mickey Garverick	R.S. Carson Assoc/Defense Engineering Services	703 379-5700(W)
Peter Gates	Arion Systems/Marine Systems Analysis & Engineering	703 356-1213(W)
Bob Gavazzi	Tuscan Corp/Management Con- solting, Strategic Planning	410 647-4320(H)
Bob Glover	US Marine Mgma/TAGOS Ops	703 442-0319(H)
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Bill Hayes	Martin Marietta-Perry Tech /Undersea Work Systems	407 842-5261(W)
Bill Hicks	EG&G Idaho/DOE Support, M&O Contractors	301 903-6322(W) 703 239-2952(H)
Jerry Holland	Armed Forces Communications & Electronics Association	703 631-6141(W)
Bill Ber	McDonnell Douglas/Tomahawk, UAV, Combat Systems	703 414-2579(W)
Ed Kaufhold	Adv Resources Tech Inc /Facili- ties Mgmt, Indus Sec, Info Sys	703 412-1140(W)
Den Koczur	Global Assoc/Eng Consulting, Warfsre Analysis	703 812-5258(W)
Lou Kriser	Synder, Ball, Kriser & Assoc /Working on the Hill	202 488-4960(W)
Glynn Lewis	PSI/ASW	703 448-3235(W)
Cole Lindell	Sonalysts/DOE and NRC Support	803 641-6705(W)
Gil Livingston	Computer SciencesCorp /Profes- sional Services Group	703 914-8535(W)
Morris Macovsky	Westinghouse & Martin Marietta /Naval Arch, Mech & Elec Eng	301 598-7056(H)
Dan Marangiello	Consultant/Engineering, Ship- building, QA	703 418-0805(W)
Herb Menach	ELS/Logistics and Technology Services	703 802-9700(W)
Bill Mickle	TRW/Operations Analysis, Engi- noering Services	703 418-2445(W)
K.J. Moore	Cortana/Inernational Submarine Technology	703 534-8000(W)
George Newton	System Planning Corp/DOD Studies/Analy, Radar Tech/Fabri	703 351-8361(W)
Sam Nicholson	PRC/SETA Support to ARPA	703 516-6038(W)
Norman Polmar	Technautics Inc/Studies & Analy- sis, Ship Engineering	703 521-3818(W)
Al Perry	Vermont State Legislature	802-848-7618(H)

Bill Rohm	APL Penn State/Basic USW R&D	703 415-0112(W)
Dick Scales	EG&G/DOD Engineering Servic- es, DOE M&O	703 418-3020(W)
Guy Shaffer	Quantum Group Inc/Retirement Consult, Resume Rev, Strat Plan	410 974-4851(W)
Joh Sheller	U.S. Customs Service	202 927-2011(W)
John Shilling	Electric Bost/Submarine Design & Construction	703 412-1802(W)
Chuck Slonim	Retirement/IBM, AT&T	703 369-6638(H)
Tom Slewart	Marine Acountics/ASW Sea Testa, Environ Acous, Oceanog	703 418-1866(W)
Stacey Strickland	Sonalysts/Engineering Consulting	803 641-6705(W)
Nick Torelli	Office of the Secretary of De- fense	703 329-9493(H)
Bob Travers	Proctor & Gamble/Contract Manufacturing	410 527-5825(W)
Scott Traver	Technistics Inc/Studies & Analy- sis, Ship Engineering	703 521-3818(W)
John Will	Socalysta/Defense Analysis, Acoustics, Video Graphica	703 931-0505(W)

NOTE: For assistance, corrections, or updates - please call Dave Cooper, Chairman of the Service Committee, Capitol Chapter Naval Submarine League, 703 648-0122(W) or 703 280-2820(H).

# NSL'S STRENGTH DEPENDS ON INDIVIDUAL MEMBERS BEING <u>ACTIVE</u>

- Let influential know what you think (and want)!
  - Recruit new members who also will be active!

## SUBMARINE BIBLIOGRAPHY A Status Update

The SUBMARINE REVIEW has published six parts of what is hoped to become a fairly lengthy bibliography of submarine-related books and articles. The aim, of course, is to compile a one-stop listing that can be referenced by members, researchers, students and those just interested in finding out more about the world of submarines, their history and workings. The Submarine Bibliography project of the Naval Submarine League is a PC-based data bank listing the author, title, publisher, date and, if possible, the location of each book. The list is sorted historically to indicate the general era of interest. For articles the listing will include some note of the subject matter, and the publication in which it appeared. The lists published in the **REVIEW** are used as inputs to that data base.

The method used so far in putting together the listings can most charitably be described as informal. In fact there has been no systematic search effort as yet, and reliance has been placed on the submissions of interested readers like Dick Boyle to get the ball rolling. We have not yet audited our list against those of the major libraries, and we still have to include books published in languages other than English. In addition, the only source examined for articles has been the Naval Institute's Proceedings.

Identification of articles of interest from that one magazine was done from an index of almost 100 years of titles. It proved to be a huge task, and among the errors made it is obvious that some outstanding articles were not recognized. For that our apologies are extended to VADM George Steele, Captain John Bryan, Captain Bruce Lemkin, and all others whom we might have missed. To make our listing complete we ask that all who know of articles not included provide us with the title, author and date of publication. If all of that is too hard, we can try to enter the index with any two of those facts.

That same plea for assistance applies to the book listing as well. As we move into a more methodical integration of the library lists, and the various individual contributions already received, we will be needing the continuing input of Submarine League members to make our compilation a truly meaningful one. Remember, at this time we make absolutely no claim to completeness; but one reason to publish the Submarine Bibliography is to provide the opportunity for the readers to make it complete.

### **ON PATROL FIFTY YEARS AGO**

## by Dr. Gary Weir

[Ed. Note: Coordinated and mutually supporting operations were instituted by U.S. submarines in mid World War II. On this patrol PARCHE accounted for 38,000 tons of Japanese shipping and her Commanding Officer, CDR Lawson P. Ramage, was awarded the Congressional Medal of Honor.

<u>The Honolulu Star Bulletin</u> of June 7th reported that VADM Ramage's Medal of Honor was stolen from the USS BOWFIN Submarine Museum. The medal had been loaned to the museum by Admiral Ramage's daughter and was being displayed under a heavy plastic cover. The paper reported that police were investigating but that no leads were yet developed.]

> USS PARCHE - Report of Second War Patrol Period 17 June 1944 to 16 August 1944

### NARRATIVE

Assigned to Coordinated Attack Group 17.15 consisting of PARCHE, HAMMERHEAD, and STEELHEAD with Commander L.S. Parks, USN, ComTaskGroup 17.15 in PARCHE.

### 17 June 1944

9030 Y Departed Midway in company with HAMMERHEAD and STEELHEAD. Held communication drills. Trim drive.

### 19-23 June 1944

Enroute area. Held daily drills, training and dives. Rendezvous with STEELHEAD and HAMMERHEAD on June 21st and passed over Group Commander's orders and instructions by line.

### 24 June 1944

0543 K Sighted small unidentified vessel bearing 322 T distance 10 miles.

0545 K Changed course to close, on four main engines.

0605 K Identified target to be patrol vessel on course 090 T, speed 10 knots with radio antenna. Battle stations.

0618 K Manned 4"/50 cal. gun.

0620 K Commenced firing deck gun, range 3600 yards. Third shot hit deck house and brought down antenna and after mast.

Target maneuvered radically at top speed until a short under his tail jammed his rudder full left. Then we both went round and round. Two attempts to man their machine gun resulted in the successive gunners being blown sky high. Finally a well places hot in his stern stopped him. Target was then closed and set afire with 20 mm incendiaries. Firing throughout was excellent in spite of moderate sea conditions. At least 50 percent hits were scored out of 60 rounds of 4\*/50 cal. fired. The steel hull took ten good holes and the topside was a complete wreck. Still the target showed no signs of giving up until she had been burning briskly for ten minutes.

0717 K Target sank stern first while six survivors scrambled out of the forward hold very much alive to our complete amazement. Investigated debris and found nothing of interest. One survivor attempted deception by putting a wooden cask over his head and spotting through the bunghole. This ruse was almost successful.

### 26 June 1944

0802 I Due north of Bonins with 100 percent overcast clouds and slick sea. Dived to avoid surprise attack by low flying planes such as were patrolling this area yesterday.

### 27 June 1944

0800 I Slowed to one engine speed, 11.5 knots in accordance with Group Commander's order to all boats to conserve fuel. Visibility zero due to low fog which persisted all morning.

### 30 June 1944

13151 Entered area. Patrolling to southward enroute assigned station.

### 2 July 1944

1947 I Surfaced and proceeded west to transit Balintang Channel.

2040 I SJ radar contact: Friendly submarine bearing 005 T distance 14,500 yards probably HAMMERHEAD.

### 3 July 1944

1600 I Made unscheduled rendezvous with HAMMERHEAD. Sighted periscope about 2000 yards ahead. Exchanged calls and information by sound.

2002 I Surfaced, proceeding west at 5 knots.

20501 Received contact report from SEAHORSE, relayed by

STEELHEAD. Enemy position was at least 200 miles to westward and well beyond our reach.

4 July 1944

0024 I SJ radar contact: Picked a good solid pip out from among several rain squalls. This proved to be 3 good pips at 21,000 yards bearing 1098 T. Went ahead 15 knots and commenced tracking.

0030 I Sent contact report to STEELHEAD and HAMMER-HEAD.

0056 I Smaller ship, at 9000 yards and plotting at better than 30 knots, swung right giving us a 45 degree angle on the bow. Our Fourth of July was then officially recognized with the Nips providing the fireworks.

0057 I The large DD or light cruiser opened up first followed almost immediately by one of the heavy cruisers at ranges 10,000 and 16,000 respectively. One splash on the starboard quarter and three more on the port quarter, all within a 100 yards plus the crack of the detonations, precipitated quite a scramble on the bridge.

0100 I Second salvo landed as the conning tower hatch went under. No spot.

0102 I Went deep and changed course to 180 T.

0105 I Four depth charges-not close.

0224 I Surfaced. All clear. Group Commander directed all boats to stop search as target group was tracking at 24 knots on course 215 T when last observed.

0232 I Made radar contact with both STEELHEAD and HAMMERHEAD.

0255 I Sent contact report to ComSubPac.

7 July 1944

0206 I Group Commander assigned new patrol stations for all submarines. Sent message to all boats.

14 July 1944

0003 I Made radar contact with HAMMERHEAD at 12,000 yards bearing 335 rel.

0010 I Made radar contact with STEELHEAD at 13,000 yards bearing 057 rel.

0100 I Delayed rendezvous due to poor visibility and choppy sea.

0355 I STEELHEAD came alongside and received instructions

and revised patrol schedule by line.

0430 I HAMMERHEAD came alongside and received her instructions.

0445 I Proceeding to new stations, wind and sea increasing from southwest. Barometer falling steadily.

18 July 1994

1955 I Surfaced in heavy stormy weather again with all the general appearances of an approaching typhoon.

2320 I Received contact report from O'Regan pack concerning a large convoy of transports, naval auxiliaries, and one or more carriers on course 215 T speed 15 knots.

2330 I Set course 260 T at full speed to intercept. Group Commander sent message to HAMMERHEAD and STEELHEAD to do likewise.

19 July 1944

0600 I Group Commander sent message to all boats changing scouting course to 035 T speed 12 knots.

1303 I Broached in heavy seas while attempting to keep regular hourly radio guard—at this time sighted aircraft carrier (no island) bearing 024 T distance 16,000 yards on course 150 T. Five or six planes were circling overhead but no other ships in sight.

1305 I Battle stations. Commenced approach at full speed.

1311 I Angle on bow 70 S range 12,000 yards. Planes have all disappeared—so at last we have the perfect dream come true—the unescorted carrier, no planes, no DDs. Estimated speed 18-20 knots.

1318 I Angle on bow still 70 S range about 8000 yards having zigged toward us 30 degrees to course 180 T.

13261 Angle on bow 115 S range 5500 yards having zigged back to 150 T which was directly into wind. Observed a plane on deck now which he flew off. But the cat was out of the bag—the end of a perfect dream.

1410 1 Carrier out of sight, single plane now apparently its only protection.

### 30 July 1944

0420 I Received report from HAMMERHEAD that she had radar contact with a convoy of 7 ships and 3 escorts on course 175 T speed 8 knots in position about 20 miles south of us. Set course 180 T at full speed to intercept.

0438 1 HAMMERHEAD reported she was attacking from port flank and verified enemy course and speed. 0040 I Group Commander requested verification of enemy position for our plot indicated that the convoy should have passed right over us three hours before.

0441 I Group Commander directed STEELHEAD to close for attack.

0450 I Received position report from HAMMERHEAD putting convoy about 30 miles to the north of us. Changed course to 000 T.

0455 I Inasmuch as this was a radical change from previous position the Group Commander asked HAMMERHEAD to verify and repeat this last position report.

0457 1 HAMMERHEAD came back with another position more to the northeast. Changed course to 035 T accordingly.

0536 I No contact yet nor any radar interference so Group Commander asked for another position report.

0543 I HAMMERHEAD replied that she has completed her attack and that convoy was scattering, giving a new position about 30 miles to the northwest of us.

0545 I This information did not seem logical for STEELHEAD was searching to the westward and had not reported contact but we changed course to 290 T as a last resort. As the sun came up it finally dawned on us that we were the victims of another snipe hunt.

0621 I So with no smoke or masts in sight, no radar interference and the planes due momentarily-Dived.

0702 I STEELHEAD reported she had been forced down by a plane and requested further instructions. Nothing more was ever head from HAMMERHEAD.

0801 I Group Commander directed STEELHEAD to conduct regular submerged patrol.

0811 I Sighted masts of patrol boat bearing 327 T on southerly course. Rain squalls prevented positive identification.

0858 I Lost sight of patrol boat bearing 215 T. Set course 215 T to trail.

09011 Heard first of seven depth charges, apparently dropped by this patrol boat.

0929 I Aircraft contact: Sighted 2 four-engined (MAVIS) patrol boats bearing 222 T. From this time on and throughout the day at least 2 or 3 planes were in sight continuously, including NELLS, SALLYS, PETES, and MAVIS'.

1025 I Sighted smoke bearing 197 T.

1100 I Smoke moving to right, changed course to 270 T.

1136 I Five columns of smoke bearing 215 T changed course to

215 T. At least three planes circling over convoy.

1150 I Smoke drawing to the left, changed course to 090 T.

1250 I Lost sight of smoke bearing 165 T convoy apparently headed southeast toward Babuyan Islands.

1752 I Sighted mast bearing 293 T moving south rapidly.

18351 Lost sight of mast bearing 235 T.

1840 I One distant explosion.

2014 I Surfaced.

2016 I Received contact report from STEELHEAD on convoy about 35 miles to the southwest on course 210 T speed 8 knots. Set course 205 T at full speed.

2100 I Told STEELHEAD we were closing for attack.

2256 I STEELHEAD asked if we were attacking.

2305 I Informed STEELHEAD that we had not yet made contact.

31 July 1944

0030 I Not yet having made contact nor having picked up radar interference, asked STEELHEAD to report enemy position, course, and speed.

0035 1 STEELHEAD came back with a position about 30 miles southeast of us indicating convoy had made a radical change of course. Set course 167 T to intercept.

0115 I Picked up radar interference dead ahead.

0240 I SJ radar contact: Convoy bearing 150 T, distance 34,000 yards. Moon just setting.

0246 I Battle stations: commenced closing convoy's track.

0301 I Picked up escort or STEELHEAD on radar bearing 348 rel., distance 9000 yards.

0307 I Six targets in convoy group tracking on course 195 T, speed 8, range 21,000 yards.

0311 I Convoy changed course to 230 T.

0313 I Escort ahead crossing over to starboard bow, range 6000 yards.

0316 I Radar reports 10 targets, range 18,000 yards.

0320 I Picked up second escort bearing 323 rel., range 12,000 yards. 13 targets now.

0324 I Convoy changed course to 215 T.

0330 I Pulling ahead of second escort abeam to port.

0333 I Convoy changed course to 195 T.

0337 I Picked up third escort bearing 300 rel., range 6000 yards.

0340 I Convoy fired a couple of flares.

0342 I Several ships in convoy barely visible now bearing 090 T, range 10,000 yards. Sky overcast, scattered rain squalls. Escort situation as follows: First escort bearing 039 rel., range 2300 yards; second escort 240 rel., range 5500 yards; third escort 290 rel., range 4500 yards, closing rapidly. Present position was becoming untenable so decided to reverse the field and close in astern of second escort now on port quarter.

0343 I Commenced swinging right from 130 T through 270 T and 000 T to 090 T.

0350 I This reverse spinner apparently confused the opposition for we now found ourselves inside the escorts with the convoy dead ahead, range 6000 yards. Plot then showed that the convoy had come right to course 270 T, putting us on the opposite (port) flank.

0354 I Commenced approach on nearest target, a medium AK. Made ready all tubes.

0357 I Found we had greatly overestimated the range and before we could get a set-up the SJ operator reported having lost the target at 450 yards. Swung full right and slid down the side of this fellow at a distance of about 200 yards. As soon as we were clear astern, continued swing to right to make another pass at him. 0359 I Commenced firing bow tubes at AK but he was already alerted and had started swinging to the left. Saw first two torpedoes were going to miss astern so checked fire. AK had now effectively blocked off an escort that had followed us in.

0400 I Spotted two ships on starboard bow which appeared at first to be flat-tops but were soon identified as large tankers. Started swinging right to close at full speed (18.5 knots).

0402 I Plot was still tracking AK which was in nice position for stern shot. TDC had good set up so fired the tube #7 at range 2000 yards. Heard one explosion about 2 minutes later, no other confirmation of damage except we could not locate this fellow after the show was over.

0407 I Closed leading tanker and fired four bow tubes on 110 port track at range 1500 yards. First torpedo disintegrated bow while other three piled into his bridge, quarter, and stern respectively. Tanker sank almost immediately leaving only small oil fire on surface.

0408 I Came hard right again to bring stern tubes to bear on second tanker.

0410 I Fired three stern tubes at this tanker on 100 port track range 1200 yards. First one missed ahead while the second and third hit forward slowing him down but not stopping him. The escorts now started to become a problem with their indiscriminate machine fun fire and flares. However along came another target, a medium AK or AP, with a sizeable superstructure just asking for trouble.

0412 I Commenced approach. Forward room reported two reloads ready.

04161 Fired two bow tubes at AP at 80 starboard track at 800 yards. Both hit squarely amidships. Ship broke in two and sank within a couple of minutes.

0417 I Came right to avoid nearest escort and headed back toward our second tanker. As we closed we could see lights on his stern indicating he was manning his guns.

04191 Crossed his track about 200 yards astern opening out for a stern shot. At about 500 yards this tanker opened up with everything he had. The 4" or 5" whistled overhead and landed well up ahead. Apparently his trim down by the bow did not permit depressing his gun sufficiently to get on us but the 20mm, 40mm, and small stuff was too hot to handle. Sent all lookouts and spare hands below. The quartermaster stuck to the after TBT until we had the set-up then—

0421 I At 800 yards range fired three stern tubes at this menace. All hit—the gunfire from that quarter was effectively silenced and with five torpedoes in her the big tanker gave up and went down leaving only small oil fire as did the first one.

0423 1 Two escorts on the port quarter were now concentrating their machine gun fire on us and we were about to come right to put them astern and head for the prize of the evening, a hugh AP, when we spotted a small fast job similar to the KAIHO MARU, coming in sharp on the starboard bow, apparently intent on ramming us. Called the engine house to pour in all the oil they had—the other fellow had the right-of-way but we were in a hurry. 0425 I When half way across his bow, put the rudder full right swinging our stern clear. The Japs were screaming like a bunch of wild pigs as we cleared all around by less than 50 feet. Mutual cheers and jeers were exchanged by all hands.

0426 I We now found ourselves boxed in on both sides by several small craft and the big transport dead ahead with a zero angle. This left no alternative but to fire down the throat.

0429 I Commenced firing bow tubes. First fish started off to the right so checked fire and spotted on, then fired two more. These were right in the groove and both hit—stopping him. Closed in on his starboard bow and then swung hard left to bring our last stern tube to bear. 0433 I Fired one stern shot on 90 starboard track at 800 yards. It was a bullseye hitting squarely amidships.

0435 I Took time out to appraise the situation and get another check on the escorts which were still busy firing at us and at each other. Radar gave a count of eight pips.

0439 I The big AP was stopped and down by the bow but showed no further signs of going down so decided to go back and deliver the coup-de-grace.

0422 I The big AP suddenly disappeared from sight and radar in one big blurb as the stern came up and went straight down, head first.

0445 I Radar reported only seven targets remaining, all small stuff (no side lobes), at ranges from 2000 to 12,000 yards.

0447 I Set course 330 T to put a little distance between us and this hornet's nest as dawn was commencing to break. This decision was further prompted by the fact that the gyro setting gear on all tubes forward had been jammed when the torpedomen commenced matching gyro setters just as the last spindle in tube #5 was being engaged, thereby bending it and preventing it from be disengaged.

0450 I One of the escorts challenged us with AA AA by searchlight; this appeared to be rather unusual until one of the quartermasters explained, "Those Japs probably have a lot of forms to fill out too." Several flares were observed and a few explosions heard as we retired.

0554 I Dived on course 315 T.

0652 I Heard one tremendous explosion.

0720 I Several distant explosions.

1325 I Several distant explosions.

2006 I Surfaced and set course for Balintang Channel.

2040 I SJ radar contact: Bearing 348 T distance 11,000 yards closing rapidly.

2041 I Lookout sighted 4-engine flying boat (MAVIS) flying low at 7300 yards. Dived.

2101 I Surfaced and proceeded as before.

2125 I STEELHEAD reported her position and six torpedoes remaining.

2230 I STEELHEAD reported results of her attacks.

2300 I Received information on HAMMERHEAD's attack in ComSubPac's nightly news bulletin.

1 August 1944

2200 I Group Commander sent departure report to ComSubPac

reporting results of patrol.

1030 VW Arrived Pearl.

16 August 1944

### RAMAGE (DDG-61) Christened in Pascagoula, Mississippi

RAMAGE is named in honor of Vice Admiral Lawson P. Red Ramage, (1909-1990) whose courage during World War II as a submarine commander earned him the Congressional Medal of Honor and two Navy Crosses. In addition to commanding USS TROUT, the first submarine to successfully torpedo a Japanese aircraft carrier, Vice Admiral Ramage became the first submariner to earn the Congressional Medal of Honor and survive. He received the Congressional Medal of Honor while in command of USS PARCHE as a result of his daring predawn surface attack on a Japanese convoy off Taiwan on 31 July 1944. Caught in a deadly crossfire from Japanese escorts on all sides and exposed by the light of bursting flares and burning Japanese merchant ships, then Commander Ramage calmly ordered his men below and remained on the bridge alone to fight it out with the enemy. When the battle was completed, USS PARCHE had crippled or sunk five Japanese ships in an action that is still referred to as the most successful surface engagement in the history of submarine warfare.

RAMAGE will be commissioned in 1995 and will be homeported in Norfolk, Virginia as part of the United States Atlantic Fleet.

## LETTERS

May 20, 1994

The Honorable T. Penny U.S. House of Representatives Washington, DC 29515

Dear Congressman Penny,

Thank you for providing a copy of HR 3958, the Fiscal Responsibility Act of 1994.

I write in strong objection to the military force reductions directed in Title II.

Providing for the common defense is a basic purpose of the federal government. The size of the armed forces must be based on evaluation of foreign policy requirements and the international threats faced by the nation, not by budget-driven fiats oblivious to reality. Although this nation still faces significant threats to its national security and the President seems willing to use our military at the drop of a UN request, he and his Administration have already cut the armed forces too much, too fast. On top of the cuts, the President routinely diverts Department of Defense assets to other purposes, as evidenced by Presidential Determinations 94-20 and 94-21. To now propose further reductions that appear to be randomly selected out-of-the-air is highly irresponsible. As I have stated in letters to other elected officials, this country will enter the history books alongside other former great nations the instant the President directs the Joint Chiefs to accomplish a mission and they have to respond "With what?"

The Section 202 requirement to single-crew ballistic missile submarines and reduce the number at sea appears, on the surface, to be reasonable, given that the President, for national security, can waive the requirement. In reality, by passage of this requirement, Congress would sign the death-knell for the readiness of our one remaining secure strategic deterrent force. I doubt that this President has the foggiest idea of what constitutes national security.

The effectiveness of the submarine ballistic missile system depends heavily on having trained, experienced personnel immediately available. Once the pool of trained personnel is reduced, it will be impossible to reconstitute the force to the levels needed in time of hostilities. In 1812, it may have been possible to impress sailors off the docks of Baltimore to man a frigate; to man a Trident requires intelligent sailors whose educational pipeline is in excess of a year. I doubt that the tyrants of the world are going to ignore the lessons of Kuwait—if you are going to invade, don't give the enemy a chance to assemble his forces.

The strategic weapons in Russia and the new countries formed by the breakup of the Soviet Union have yet to be reduced in significant numbers and the region is politically volatile and unstable. The number of nations with ballistic missiles and nuclear warheads continues to grow. We are fools if we, at the same time, make drastic cuts in our ability to field a credible armed forces or a credible strategic deterrent.

I urge you to consider carefully the implications and consequences of Congress dictating force structures independent of the threat to our national security. It is time to stop looking at the defense budget as a great untapped source of spending cuts.

> Sincerely, John D'Aloia, Jr.

### CAPTAIN PAUL SCHRATZ, USN(RET.)

I was saddened to hear that Paul Schratz had died 28 February 1994. Paul was my first skipper in submarines and the one from whom I learned all the qualities a great commanding officer should possess. Paul was a natural leader as well as a very talented man in most disciplines.

Paul had a touch of ego, but could do all the things he said he could do. He led the way, and his wardrooms and crews would follow. He was not a preacher; he was a doer blessed with a tremendous sense of humor.

With a violin or a cocktail, Paul made the most of his every hour. A magnificent manager of time, he seemed to accomplish so very much during his life. He made the difficult look easy.

It was hard to tell Paul's priorities; he was so good at everything. Those who knew and loved him will vouch that Henrietta and the children came first. Submarines, the violin and knowledge came second.

To know him was to love him.

Ted Davis

### REQUEST FOR FIREBALL INFORMATION

23 May 1994

To Whom It May Concern:

We have been interested for a number of years in the evidently rare phenomenon popularly known as ball lightning—the production of luminous balls during thunderstorms which have been observed to persist for several seconds. We have also heard reports that luminous fireballs were occasionally observed within electric-powered submarines when the large battery banks were accidentally short-circuited. We are very interested in the possibility of getting more detailed reports of this phenomenon from those who had first hand experience on electric subs. Would it be possible to run a short request in a future issue of SUBMA-RINE REVIEW for such information?

Thanks in advance.

Sincerely, Earle Williams Department of Earth, Atmospheric and Planetary Sciences Massachussetts Institute of Technology Cambridge, MA 02039-4307

I was assigned to USS SEAFOX (SS 402) while it was under construction in Portsmouth, New Hampshire. I served aboard her until the end of the war.

Do you know of any way I might contact any crew members. Thanks,

> Eugene F. Cooper 883 Bowen Avenue San Jose, CA 95123 (408) 578-6000

### REQUEST FOR WWII INFORMATION

I am a professional naval writer and historian researching a project on the special missions conducted during the Opn Torch North Africa landings of 8 November 1942.

One of those missions was conducted by USS BARB, when she launched Army LT Willard G. Duckworth and his rubber boat crew, who were to paddle to the Safi breakwater and signal in the destroyers COLE and BERNADOU for their special missions-landing 47th Infantry assault troops.

For research purposes, I'd like to get in touch with any BARB crewmen who might be members of your League to obtain their recollections of that Opn Torch mission, ideally the 1st LT or someone directly involved with preparing and helping to launch LT Duckworth and his rubber boat crew.

Information is also requested about all circumstances involved in the mission and members of Duckworth's men.

Any help you can provide on this matter would be much appreciated.

Thank you very much. Sincerely, John B. Dwyer 430 Westbrook Dayton, OH 45415 (513) 890-5654

## VICE ADMIRAL BOB RICE REMEMBERED

15 June 1994

Bob Rice was my first wartime skipper in DRUM (SS 228). He died in Vermont at age 90 after a long bout with Alzheimers, and was buried in the Naval Academy cemetery on 13 June 1994. He was a member of the Class of 1927.

I had the honor of delivering a eulogy at the service, and found much satisfaction in telling tales of days long gone. How Bob, one of the more senior of the early skippers, exhibited such skill in handling a periscope; how he brought finesses to attacks, and how he persevered against the many unknowns in the early days of the war. (How good were the Japanese? What was a close depth charge? And how best to evade an enemy you could not hear?)

He completed DRUM's first three patrols and then commissioned PADDLE (SS 263), making two more. He was awarded two Navy Crosses for his service in DRUM.

I give him much credit for such success as I enjoyed as a submariner.

> Mike Rindskopf C.O. DRUM 1944

## BOOK REVIEWS

FORGED IN WAR The Naval-Industrial Complex and American Construction 1940-1961 by Gary E. Weir Naval Historical Center, Washington, DC 314 pages, ISBN 0-16-038258-0

## Reviewed by RADM Malcolm MacKinnon, III, USN(Ret.)

This book is an excellent example of the merits of the study of history, even history that is relatively recent. The problems facing the U.S. Navy, particularly the Submarine Force, today warrant a careful examination of the period immediately following World War II.

There are remarkable parallels in such areas as threat and mission analyses, industrial base preservation, conversion to peace-driven economy, privatization of public facilities, and judicious application of significantly reduced budgets, particularly in investment in technology. As the author puts it, "Would the coalition of the Navy, industry, and science, forged in war, find a peacetime role?"

As all of us Submarine Leaguers know, the submarine emerged from World War II as one of the most effective weapons systems in our arsenal. Similarly and indisputedly, the submarine emerged from the Cold War as the principal element that brought the Soviet Union to its knees. It is as unthinkable now as it was 50 years ago that this remarkable weapons system could be put on a shelf, decommissioned in large numbers, that the shipyards that built and maintained it could be facing closure, and that the engineers and scientists who provided the technology and designed it could be forced to direct their skills elsewhere.

Of course, there are vast differences between the situation 50 years ago and the present one. World War II took us out of an economic depression and lasted four years. The Cold War started in earnest when the Soviet Union detonated their first fission bomb and lasted until dissolution of the Evil Empire in 1991, over 40 years. The nation was 100 percent single-minded in World War II; during the Cold War, we were far from that. Technology and

its effects were simpler, more clear cut and easier to focus on in 1945. The German snorkel and Type XXI came to us as war prizes and the resources to exploit them were made available. The lapse between the end of World War II and the start of the Cold War was a few years, at best. Now, the same few years after the end of the Cold War, no comparable threat to our national security has emerged. No impetus has been provided to renew our efforts in submarine design and development.

Nonetheless, the situations described in <u>Forged in War</u> have applicability and I whole-heartedly recommend this book as required reading for all those interested in the future of submarines and submarining.

As a retired Engineering Duty Officer who spent the bulk of my 35 years of service involved in the design, construction, and maintenance of submarines, I found this book absolutely fascinating. Its pages are full of my mentors and former colleagues and bosses. Dr. Weir did a great job culling available archives and records as well as interviewing available sources.

This book is a perfect companion piece to Hewlett and Duncan's <u>Nuclear Navy</u>, 1946-1962 and to Duncan's <u>Rickover and</u> the <u>Nuclear Navy</u>: The <u>Discipline of Technology</u>, concerning itself as it does with the technical aspects of the submarine apart from the reactor plant. <u>Forged in War</u> fills a long existing vacuum by relating the story of submarine development largely from outside the reactor plant.

I was also fascinated with the accounts (really ED sea stories) of the engineering problems recounted by the author. The failure of condensate piping during the first ever hot ops on NAUTILUS and its aftermath was an account I must have heard hundreds of times during my career in efforts to hammer the lessons learned into my meager brain. The lessons were: (1) the importance of hot ops and any test program, and (2) material control-seamless pipe was called out by spec; welded pipe was installed and failed. The evolution of the designs of ALBACORE, NAUTILUS, SKATE, SEAWOLF, and GEORGE WASHINGTON was also recounted accurately and with the proper recognition of the key individuals: Andy McKee (father of the fleet boat and former Chief Engineer of EB), Don Kern (my former boss as Submarine Type Desk Officer, BuShips, in the mid-60s), Harry Jackson (the current dean of submarine designers), Henry Nardone (ex-ED and longtime Project Engineer, EB, NAUTILUS to SEAWOLF II), Eddie Arentzen (my boss at MIT and preliminary designer of

SKIPJACK), Jack Leonard (longtime Head of Nuclear Engineering, EB), Russ Brown (longtime and key EB Naval Architect and Engineer), Red Raborn (first Head, Special Projects Office), Levering Smith (first Technical Director, SPO, later Head), and John Craven (former Chief Scientist, SPO).

The involvement of the scientific community over the years was also comprehensively treated. From the invention of the BT during World War II to the solution of the problem of depth control when launching a Polaris missile at low speed, Dr. Weir spent a great deal of effort pouring through archival reports and conducting interviews where possible. He was fortunate to interview Allyn Vine, the inventor of the BT and father of ALVIN, before he died. Dr. Weir leaves no doubt of the importance of the contributions of the scientific community to the successful evolution of submarine design and tactics. This gives reason to ponder about the direction submarine research and technology will take once the draw-down, restructuring and prioritizing are finished. We can only hope that the necessary resources are applied and the proper technologies nurtured.

As one reads of the evolution of the modern submarine, from ALBACORE and NAUTILUS to SKIPJACK, GEORGE WASH-INGTON and beyond, there is a message that, in my opinion, must be listened to. We have no alternative today but to espouse and provide funding for a continual design team effort, separate from and beyond the new attack submarine (NAS or NSSN). We must be prepared to justify the funding of periodic prototypes like ALBACORE, NAUTILUS, TULLIBEE, SKIPJACK, JACK, and NARWHAL. Unless we do, our design capability will wither and die, to say nothing of our industrial base of builders and suppliers. Missions change and technology advances. Without a central continual conceptual design effort, we will have no critical mass, no way to continually be able to articulate our submarine needs. In this era of heavy competition for meager defense dollars, we have no alternative or the submarine will become what it was to the navies of the world in 1904, an expensive toy.

Today's naval warfare and research and development planners had best heed the message in Forged in War:

... "the principle of building pre-prototype and experimental ships on a continuing basis must have acceptance in order to fully exploit militarily what a rapidly unfolding technology has to offer and permit ship design and construction to keep abreast of the advances..."

### DICTIONARY OF MILITARY ABBREVIATIONS

by Norman Polmar, Mark Warren and Eric Wertheim Naval Institute Press, Annapolis, Maryland 307 pages, \$23.95, ISBN 1-55750-680-9

## Reviewed by Jim Hay

The age of jointness is upon us and we have to converse with our newly-siamesed brothers-in-arm in the several dialects of a supposedly common language. To that end, Norman Polmar and his two collaborators, last summer's interns at the Naval Institute, have produced a reference compendium designed to answer the "what is he talking about?" question that all of us have from time to time when the in-talk gets thick with jargon.

Submariners more accustomed to speaking only to others of their ilk can find help in a range from A1 (Staff Officer for Administration-USAF) and A-109 (the OMB Circular) to Yak (Soviet-Russian aircraft designation) and YOYO (You're On Your Own-Slang). For those outside the dolphin circle who might wish to understand those on the inside, there are ORSE (Operational Reactor Safeguard Examination-USN), SLOT (Submarine Launched One-way Transmitter-AN/BRT-1), and SOAC (Submarine Officer Advanced Course-USN).

The list of abbreviations makes up the bulk of the book, but there are also helpful chapters which explain, and list, Aircraft Designations, Aviation Unit Designations, Military Ranks, Missile and Rocket Designations, and Ship Designations.

On a much more personal level for Submarine Leaguers, the front page carries just the following:

Dedicated to Patricia Lee Lewis Submariner par Excellence



## NAVAL SUBMARINE LEAGUE HONOR ROLL

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## AMADIS, Inc. Member Since 2/9/93

A MADIS is a small business professional services firm providing support to government and commercial clients, in management sciences, engineering and information systems, both national and international.

AMADIS' roots are founded in years of leadership experience in successful program management. From planning and scheduling to the detailed analysis of project progress, AMADIS provides tools and services that increase the efficiency and effectiveness of the project team in achieving their objectives. Personnel, both corporate and consultant, have been committed personally and professionally to successful program management for many years from various positions and perspectives.

Becoming competitive in the world market is a major thrust in today's industry. AMADIS personnel thoroughly understand the international marine industry and the DOD acquisition process, placing them in a unique position to assist in the defense conversion, reinvestment and transition efforts for becoming a world class, globally competitive maritime nation.

Diversity in marine engineering capabilities is evidenced by the variety and nature of the technical support which has been provided to our clients. Engineering talent ranges from technical litigation support to development of engineering studies and engineering management plans.

The area of standards has assumed a pivotal role in global competitiveness and profitability. The requirement for U.S. marine standards to be compatible with those of the rest of the world is essential if the U.S. is going to compete in the field of export of commercial ships and marine products.

The ISO 9000 certification requirements are being widely adopted. Environmental concerns are reflected in standards being developed. Governments are setting such requirements for entering ports and harbors.

AMADIS senior corporate leadership has been at the forefront of international standards participation in the U.S. for over 10 years and in commercial standards development for over 14 years with the marine industry. Through an established international network AMADIS can assist others in getting their needs reflected in the standards. As ISO 9000 is becoming a prerequisite for business sales overseas, it is necessary to adopt a pragmatic approach to certification. AMADIS can assist others in understanding the requirements and assessing which certifiers best suit their needs.

## Precision Components Corporation Member Since 5/24/93

recision Components Corporation, located in York County in South Central Pennsylvania, has a proud history of serving the nation's defense needs for over three decades. During the earliest days of Admiral Rickover's new initiative to build a nuclear powered submarine fleet, Precision Components, then a division of Allis Chalmers Corporation, provided the reactor vessel internals for the Shippingport Reactor. By the mid-1980's, Precision Components Corporation had supplied reactor vessels, core baskets, closure heads, pressurizers, steam generators and other plant and servicing equipment for the nuclear fleet. Precision Components reactor equipment has been installed in the Sturgeon and Los Angeles Class attack submarines, as well as the Poseidon and Trident Class SLBMs and the Nimitz Class aircraft carriers. A steady flow of primary plant nuclear hardware was processed through the Precision Components fabrication facility until February 6, 1992. On that date, the SEAWOLF production schedule was scaled back to one to three ships, and approximately 40 percent of Precision's backlog was terminated or suspended.

The loss of the SEAWOLF program affected Precision Components in the same way it affected the shipyards and many other suppliers. Cut back, down sizing and searching for replacement markets has become a new and immediate mission for large and small companies alike. Precision Components has been forced to look to markets outside of the reactor plant components in which to utilize the technical talent and craftsmanship honed by three decades of meeting the highest of manufacturing and business standards.

Precision Components business development activity has been broadened to include nuclear utility, DOE, Navy and Army programs. Some of the components within these programs are very familiar, and some only similar in content to the traditional products produced by the company.

In the familiar category are orders to provide major portions of the SEAWOLF propulsor. Although these Precision Components orders are with a national laboratory and another major defense supplier, the specifications are familiar. Precision Components also has been successful in seeking other major Navy sources of supply, such as Lakehurst and Electric Boat, and is currently becoming a part of their supplier base.

During the past 30 years, Precision has been called upon by the Navy to supply spent nuclear fuel storage/transportation containers. All of these containers have required the highest standard of workmanship and compliance to specifications. Precision Components is determined to apply the years of experience and lessons learned to providing custom manufacturing services for similar storage and transportation containers in support of U.S. nuclear utilities and the DOE. A recent order for 14 spent fuel dry storage containers to be used at the Virginia Power Surry Plant will enter full production by year's end. This order represents the largest single order for dry storage containers ever awarded to a U.S. fabricator.

An Army program to safely dispose of chemical and biological warheads provided the company the opportunity to expand into similar markets. Precision Components is a subcontractor to a division of Westinghouse which successfully competed for the supply of on-sit transportation containers. If all options are exercised, this order will extend into the late 1990s. Although the Army's requirements and methods differ from the Navy, the pursuit of excellence and expectations are the same.

As Precision Components looks toward the future, it is the sound business practices, craftsmanship and technical approach, so necessary to succeed for three decades as a supplier to our nuclear Navy, which forms the foundation that will be valued by customers throughout DOD, DOE and the commercial procurement community. Precision Components' efforts to broaden its role in support of critical national and commercial programs, outside the boundaries of the Naval Nuclear Program, will continue. Precision Components Corporation stands ready to serve the broader market.

## WELCOME ABOARD TO NEW CORPORATE BENEFACTORS

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## MORE SUBMARINE SEA STORIES

[We routinely will publish short anecdotes of general interest to Members, as space and material permit. <u>Members are encouraged</u> to submit their anecdotes at any time; if not used in the SUBMA-RINE REVIEW, they will be considered for use in the next issue of the NSL Fact and Sea Story Book.]

### Acts of God Not Permitted

Many are the incidents that reflect Admiral Rickover's impact on the Submarine Force. One such incident occurred to me when I was a submarine Flotilla Commander. As such, I was called upon to represent the Force Commander on several occasions on the trials of newly commissioned FBMs. Such trials were always an experience to remember as Admiral Rickover and his merry men kept all hands in a state of constant stress.

One set of trials in which I participated gave me a first class example of Admiral Rickover's omnipotence. It involved a trial in the Norfolk area which required a rendezvous with an ASR (submarine rescue vessel) for a deep dive beyond the 100 fathom curve. The ASR left New London and was enroute to the rendezvous while the FBM was conducting ship control drills off Norfolk.

Everything seemed to be going well. The crew had been properly stressed and we cleared the sea buoy off Norfolk and were heading for the deep dive rendezvous. Suddenly, I received a voice message from the ASR that, as he expressed it, an act of God had occurred which translated into his having a 60 foot ketch in tow which had lost its rudder and which had been adrift for four days. The ASR skipper of course indicated that he would be unable to make the scheduled rendezvous on time.

After quickly plotting in the ASR position, I decided to inform Admiral Rickover of the problem and that I was in the process of improvising a solution. I knocked on the door to the Admiral's cabin, entered, and began my briefing with the words of the ASR skipper about the act of God. This elicited an immediate response by the Admiral that "There are no acts of God and that he had no intention of having his schedule interrupted and that I was to inform COMSUBLANT that he would not put up with any delays". Needless to say, I responded with a cheery, "Aye, aye, Sir!" and beat a hasty retreat to lick my wounds and to consider what could be done.

Upon looking at the chart, it was apparent that the ASR was off Watch Hill where there was a Coast Guard station nearby. Fortunately, the nonexistent God provided me with a possible solution. I told the ASR skipper to check out the tow as to their satisfactory condition, call up the Coast Guard to put a plane on top, arrange for a Coast Guard tow, inform the crew of the ketch of the proposed action, and then cast them loose. The skipper of the ASR rogered and much to my surprise was back on the circuit in three or four minutes. He stated that he had encountered another act of God. I immediately interrupted him and told him I couldn't handle another act of God down here—one was enough. However, I was then elated when he informed me that a tanker had come over the hill, and would pick up the tow—the schedule would be met.

I went posthaste to inform Admiral Rickover of this fortuitous event. However, I decided on a different tack. I announced to the good Admiral that COMSUBLANT had taken care of the situation, the schedule would be met and that COMSUBLANT wished the Admiral a successful set of trials. The Admiral was slightly taken aback and responded that such quick action by the operators was damn unusual and continued eating his grapes...which is another story.

CAPT R.C. Gillette, USN(Ret.)

## EARLY WARNING!!

We will publish the next edition of NSL Fact and Sea Story Book in mid-1995.

Send in your Sea Stories now to reserve space!

### ANNUAL NROTC AWARDS

Congratulations to the following NROTC students who represent the top graduate in each Unit that will enter the submarine force upon graduation this year.

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### LITERARY AWARD CONTEST WINNERS

Congratulations to the following winners of 1993/1994 NSL literary awards:

<u>Third Place, NSL Literary Award</u> Mr. Dick L. Bloomquist Air-Independent Propulsion - A Historic Perspective from Walther to Stirling

Second Place, NSL Literary Award RADM Richard A. Buchanan, Jr. New Thinking About Deterrence

<u>First Place, NSL Literary Award</u> CDR N. French Caldwell, USN Submarine Force Structure: Peacetime Presence or Wartime Patrols

Winner, NSL Active Dury Literary Award LCDR Wade H. Schmidt, USN The Multipurpose Platform of Choice

Winner, NSL/U.S. Naval Institute Essay Contest for articles on either submarining or ASW that have been published the past year CDR P. Kevin Peppe, USN Victory and Perhaps Defeat (Submarine Review) and Submarines in the Littorals (USNI Proceedings)

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Congratulations to the following winners of the 1994 NSL Fleet Awards:

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LCDR Joseph E. Johannes, Jr., USN, USS MICHIGAN (SSBN 727) (BLUE) LOCKWOOD AWARD for SUBMARINE PROFESSIONAL EXCELLENCE

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 To stimulate and promote an awareness, by all elements of American Society, of the need for a strong submarine arm of the U. S. Navy.

 To encourage mutual understanding and a close working relationship between American Society, and those segments of the United States government responsible for the acquisition and employment of submarines for the common defense and national security.

3. To identify and study submarine problems affecting the common defense and national security of the United States, develop solutions to such problems, and provide such solutions to those governmental agencies charged with responsibility for common defense and national security.

 Through individual and collective action, to help the active and reserve military establishment to address submarine maritime issues.

To bring together the various diverse elements of the military, particularly in relation to problems associated with maritime submarine service.

 To promote greater liaison and communication among the military, academic, and business communities on issues concerning the maritime submarine force.

To provide a forum whereby the views and perception of its members can be focused and expounded.

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