THE SUBMARINE REVIEW

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FROM THE PRESIDENT

This issue of THE SUBMARINE REVIEW provides my first opportunity to express to the League membership how pleased and proud I am to have been selected to serve as your President. Not very long ago, during the ceremony in which I relieved as COMSUBLANT, I concluded my two-sentence acceptance speech with the ancient, but very appropriate words, *Surely, my cup runneth over.* Today, by comparison, we are talking major flooding.

As a result of the dedicated efforts of the visionaries who initially organized the League and nurtured it from infancy through adolescence, we are heirs to a smoothly functioning machine, well recognized as the unofficial, but very professional voice of the submarine community. The office staff is superb. The new headquarters building is a thing of beauty, worthy of a visit whenever you are in the area. Membership is slowly, but surely increasing. Our chapter system is expanding. The REVIEW is widely acclaimed. Our annual Symposium has quickly become a tradition. And the Submarine Technology Symposium, co-sponsored by The Johns Hopkins University Applied Physics Laboratory, has become the premier event of its type. The Submarine League is on a roll! The timing of this coming of age could not be better.

I have long been concerned that we have not been totally effective in our efforts to educate the general public about submarines and submarine warfare. As a reminder, the first objective of the Naval Submarine League is, "To stimulate and promote an awareness by all elements of American Society of the needs for a strong Submarine Force", clearly a license to go forth and advertise. Unfortunately, we tend to huddle comfortably in familiar groups of true believers and lecture to ourselves about inherent stealth, firepower, sustainability, cost effectiveness, mobility, and so forth, all in perfect resonance. It is imperative that we now preach that gospel to the uninitiated; enthusiastically and often. We have a good story to tell, and there is in the general public a great interest in submarines. It is not our bag to lobby directly, but a "bottom up" groundswell of support for submarine programs wouldn't hurt. We are open to suggestions on how best to deliver the

message.

This issue of THE REVIEW is devoted principally to the proceedings of our recent annual Symposium. As you will see from the articles, we had an all-star lineup of speakers. That program, combined with the great social events, guaranteed another smash success. Save your pennies, and join us next June for an unforgettable experience.

Bud Kauderer

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EDITOR'S COMMENTS

This entire issue of the REVIEW is devoted to bringing to the members of the League a printed version of the proceedings of the Eighth Annual NSL Symposium held last June. This is done to give those unable to attend a chance to share in the outstanding presentations and also to provide the attendees with a more complete and lasting reference than their own notes. This Symposium was held at a time of great uncertainty, and consequent concern by all for the maintenance of order in this new world, particularly in face of declining defense fundings. The statements of those concerns by the various speakers represent authoritative views of the various issues to be addressed by the submarine community over the immediate future. Accordingly, members may wish to draw upon these presentations in their dealings with the public.

We were fortunate to have the Secretary of the Navy provide an overall setting of both the present and the future, and give us his informed opinion of where the United States, the Navy, and the Submarine Force fit in that picture. SecNav's Executive Branch view was ably complemented by Congressman Sisisky's perspective from the Hill.

Dr. Herzfeld, the new Director of Defense Research and Engineering, identified as one of our main issues the need for **effective and imaginative R&D** in the search for the best technologies with which to design, produce and outfit the successor to the SSN-21. Admiral Bruce DeMars, in a more immediate vein, called out the generation of **support for the production of the SSN-21 attack submarine** as the most pressing issue facing the Force. Admiral DeMars also intro-

duced the subject of the **Industrial Base** as being of concern in a future of reduced ship production levels.

RADM Bill Habermeyer concentrated on the SSN-21 issue by emphasizing the need for that ship's increased **multi-mission flexibility** in order to meet the spectrum of both predictable and now-unforeseen taskings for future submarine involvement. The Soviet threat was well treated by Captain Bill Manthorpe, the Deputy Director of Naval Intelligence, as he specifically addressed the matter of **quality versus quantity** in the smaller, but more modern Soviet submarine force and commented on the possible difference between our **own perception of Soviet intentions and an objective assessment of their capabilities.** Similarly, John Benedict of the Johns Hopkins Applied Physics Laboratory presented his studies of the proliferating submarine threat developing in the Third World. To round out the trio of discussions about subjects that deserve considerably more attention in the days to come, Norman Friedman offered a "detached" view of the world in which our submarines will have to perform.

Changes in the strategic submarine world were covered by RADM Bill Owens, and he highlighted the **importance to the Soviets of their strategic forces** as their main claim to influence. RADM Owens also examined the **changing relationships** between the air, land, and sea components of the U.S. strategic TRIAD and emphasized the new capabilities in our TRIDENT submarines.

There are two pieces in this issue that did not originate at the Symposium but they are included here to give added emphasis to one current issue, **the SSN-21**, and one potential, **Naval Arms Control.** Both are extracted from speeches; one by the CNO in the Soviet Union, and the other by COMSUBLANT in which he states the operator's side of the new submarine story.

This Annual Symposium Issue addresses many of the major problems facing us today and I hope you will have the time to read and digest these thoughts and opinions. To continue to bring these discussions by policy makers and other experts forward between the yearly general membership meetings (and hopefully to generate some meaningful debate within the membership), THE SUBMARINE REVIEW will invite those

best qualified to comment on the issues which we feel are important and need deliberate exposition. This is not a change in editorial policy, but rather a timely restatement of our aims. We expect, of course, that the greater part of the REVIEW will continue to be the same type of articles, discussions, letters, news reprints, and book reviews that have been so successful before, much of which comes from our membership.

Jim Hay

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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.

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

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ADDRESS BY
THE SECRETARY OF THE NAVY

The Honorable H. Lawrence Garrett, III

Thank you Admiral Trost. I have to admit that when I learned that the Admiral would be introducing me this evening I was a little apprehensive about coming here. It occurred to me that a Chief of Naval Operations with only two weeks to go until his retirement might be tempted to stand up and say what he **really** thinks about the Secretary of the Navy. That he said nice things about me even though he didn't **have** to not only eases my mind but touches me deeply. Thank you, Carl.

Ladies and gentlemen, I am delighted to be here tonight. It's always a privilege for me to meet with, and speak to, a group of people who care about the Navy, who share an interest in the submarine community, and who contribute so much to the vigor of our undersea forces.

In the course of my career I have been an aviator, a lawyer, a quasi-businessman, and now an administrator. But my heart has never left the deckplates of the diesel boat, USS SEA POACHER, where I began my career as a machinist mate in the early 60's. No job in Washington can ever compare with being a part of an operational submarine crew; but even if I can't actually be out there on the pointy end of the spear anymore, I derive the greatest possible satisfaction from working for the people who **are** out there.

Over the last two days you have heard much about the state of the Navy's submarine fleet from a program of distinguished and knowledgeable speakers. You have heard talk about plans and policies, about new technologies, and about money and how little of it there will be for a while.

I don't intend to take you back over that well-traveled ground this evening. Instead, I would like to take a step back and share with you, for a few minutes, what I think it all means in the larger scheme of things.

As I see it, our agenda for the next decade or two is going to driven by three wide-open questions.

First, where is the **world** going? I don't pretend to know the answer to that question, but I'm pretty certain I know

where it's **not** going. History, if it tells me anything, says that we will not find ourselves anytime soon in a global congregation of polite and peaceful governments. The Warsaw Pact is in shambles, true, and Marxist philosophy has publicly declared itself bankrupt. The threat of a Soviet conventional invasion across Europe's central plains, the World War III for which we have girded ourselves since 1945, seems comfortably remote.

But, although a few giddy intellectuals have declared the "end of history," I simply cannot buy the notion that all the sweeping questions of man's political existence are finally settled.

I'm not convinced that force as an instrument of policy is obsolete.

I don't believe that we can cancel our investment in defense and cash in on something called a "Peace Dividend."

Yes, I'm excited by what I see in Eastern Europe. But I'm also conscious of the fact that one of the most stable, predictable eras in the history of the western world is coming to an end. Societies are throwing off their chains all over the Communist world, and we can be happy about that; but the West faces both old and new dangers -- from assertive nationalist sentiments, from political radicalism, from religious fundamentalism, and from the timeless inclination of powerful and unscrupulous governments to take advantage of vulnerable neighbors. In short, the oppressive but predictable stability of the Cold War era is being replaced with the exciting, but dangerously **unpredictable**, challenges of the post-Cold War era.

What we don't know about that era **can** hurt us, especially if we don't use some prudent common sense.

We don't know, for example, how the liberated nations of Central and Eastern Europe will resolve, if they can, their ancient border disputes. We don't know if and when Moscow will suddenly lose its reformist nerve. And we don't know if China will make a violent, last ditch stand for world Communism. We don't know which Middle Eastern fanatic will next start launching missiles and terror at the West. The 1990 map of the political world is covered with question marks; in Europe, in Southeast Asia, in Latin America, in the Middle East, on the Indian subcontinent. The enticing prophecies of

world peace might seduce us, but they sure as hell won't respect us in the morning.

That brings us to the second question: where is America going?

In an article for The Atlantic Monthly last month John Lewis Gaddis wrote about the "dog-and-car syndrome."

"The name," he said, "refers to the fact that dogs spend a great deal of time chasing cars but very little time thinking about what they would actually **do** with a car if they were ever to catch one. Our leaders are not all that different: they pour their energy vigorously into the pursuit of victory... but when victory actually arrives, they treat it as if it were an astonishing and wholly unforeseen development."

Gaddis is wrong, of course. Most of the Country's leaders know exactly what they want to do with that victory. The problem is that they don't always agree on it, and the rather sordid process that has evolved for reaching compromise reflects, now and then, something less than great credit on the business of politics in Washington.

Nevertheless, in my opinion the United States is, and has been for almost fifty years, the world's one and only superpower. Russia has tried to share that crown, but the events of the last two years plainly expose its great Orwellian edifice of arms and bluster as a fraud; dangerous, yes, but entitled to no claim of political legitimacy or economic viability.

With American power, however, comes global responsibility. Our citizens and our economic interest are scattered around the word. We have made moral commitments, both formal and implied, to scores of friends and allies. The price of our wealth and influence is the obligation to use them in the support of justice and human decency. While our problems at home are compelling, we cannot use them as an excuse to abdicate our vital interests or our responsibilities abroad.

Marxist doctrine may have exhausted itself in the bread lines of Moscow, but an ever-larger free world still expects us to counter the threat of Soviet arms, to offer stability in Europe and Asia, to stave off anarchy in the Middle East, and to defend vital lines of trade and communication from extortionists of any stripe.

None of that will happen by the force of law or diplomacy

alone. Until that unlikely day when all the world's nations submit their sovereignty to common laws and the judgement of their peers, we cannot be reluctant to carry a big stick.

Which brings us to question number three: where is the Navy going?

Yes, it is going to be smaller, you can count on that. The budget-cutters are sharpening their knives, even as we speak.

The challenge for us will be to shape a more compact force that still meets the needs of the 90s and beyond. We can live with a leaner, tougher Navy; but we can't live with an eviscerated one; for the security of the United States depends ultimately on its maritime power. Our borders are sea borders, our lines of communication are sea lines of communication, the forward edge of our defensive lines are where international seas begin.

The submarine force plays a critical role in that maritime power, and it always will. The notion that Perestroika obviates the need for strong and modern subs, attack boats as well as boomers, is plain wrong.

The logic of nuclear deterrence has not changed just because the Soviet leader routinely presses the flesh on Pennsylvania Avenue. American SSBNs have been a continuous and obvious reminder to the Kremlin that war with the United States or her allies, because it would call down unthinkable destruction, serves no rational purpose. Our candid determination to use those weapons has guaranteed that they would **not** be used, and it has thwarted the Kremlin's ambitions to achieve its goals by force of arms. Winston Churchill, as usual, said it best almost thirty years ago:

> *The annihilating character of these agencies may bring an utterly unforeseeable security to mankind... It may be that when the advance of destructive weapons enables everyone to kill everybody else no one will want to kill anyone at all.*

In short, as long as a nuclear threat exists anywhere in the world, our ability, best represented by state-of-the art strategic submarines, to deter their use is critical to our basic national survival.

Our fleet of attack submarines give us the extraordinary and economical flexibility to conduct a range of operations, from full-scale conventional warfare to low intensity conflict. As a

platform for ASW, the Navy's number one warfighting priority, it is unexcelled, but it can just as effectively prosecute surface targets, launch strikes ashore, lay mines, insert special operations forces, and gather intelligence. The emphasis for naval forces of the future will be on flexible and efficient platforms that can assert themselves in virtually any combat regime; and attack subs have already demonstrated their continuing ability to fill the bill.

This Country must have a submarine fleet that is strong, ready and capable, and I'm counting on the Naval Submarine League and its members to continue its eight-year-long success in helping to put that word out to the public.

Know that the submarine fleet, like the rest of the Navy, is going to be smaller. But know also that we're going to fight for the R&D money to keep it modern, and we're going to fight for the personnel programs to keep it properly manned. Finally we're going to encourage the kind of inspired, creative and intelligent leadership that makes the difference in any theater of combat. Francis Bacon once commented that the size of an army is not much important where the Nation is of weak courage; for, as Virgil said, *It never troubles the wolf how many the sheep be.*

The post-Cold War world is depending on American strength, courage, and wisdom; and America in turn depends on the professionals who go under the sea in ships.

Ladies and gentlemen, thank you for having me here tonight. Godspeed, and keep up the great work.

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ADDRESS BY
A MEMBER OF CONGRESS

The Honorable Norman Sisisky

I want to thank you for giving me the chance to discuss some of the most vital issues facing our nation. Admiral Bob Long's invitation suggested I outline my views about the defense budget, as well as make some comments about our submarine fleet.

It's an appropriate time to discuss the defense budget. Last year's events in Eastern Europe and the USSR make comprehensive reassessment of America's defense posture essential. Common sense suggests that future U.S. military forces will be smaller reflecting a reduced threat to U.S. interests around the world.

Common sense also suggests our military will be restructured to reflect specific changes in Europe -- where the substantial portion of past military planning was focused. Common sense suggests future military forces will be smaller, and structured differently. But from my perspective as a member of the Armed Services Committee, achieving consensus on specific characteristics of tomorrow's military is proceeding at a snail's pace.

For the past few months, our attention has been focused on the disagreement about reprogramming FY 1990 funds to meet obligations in military personnel accounts and the Champus program. The reprogramming problem was finally solved by the Speaker of the House and the Secretary of Defense; but the debate about last year's budget diverted attention from decisions that need to be made for 1991 and subsequent years.

The interest in last year's budget was not the only reason for a lack of consensus. The President and Secretary of Defense acknowledge that changes have occurred - and their budget request had negative **real** growth. But at the same time, they imply U.S. military capabilities should not be changed -- and insist force modernization should proceed (at least in the near term).

In contrast, the House of Representatives responded to the reports of political revolution in Eastern Europe and the Berlin Wall coming down by passing the budget resolution on

May 1, 1990. The House budget resolution provided for a defense budget of $283 billion. That is $18.6 billion less than the $301.6 billion appropriated for 1990, and $23.9 billion less than the $306.9 billion proposed by the President for 1991. Although the Senate has not adopted a budget resolution, the Senate Budget Committee has voted to make reductions similar to the ones passed by the House.

The defense posture that the United States has maintained for the past forty years will change, and probably change dramatically, in light of the political turmoil in Eastern Europe and resulting changes in the Warsaw Pact. The large standing ground and air forces that the United States maintained in Europe as a part of NATO will be reduced. Many troops will be brought home and deactivated. Troop deployments in Korea are being reviewed and will likely be cut back. Negotiations about our continued use of Clark Air Base and Subic Bay raise new questions about how we will maintain a U.S. presence in that region.

At home we have a continuing budget crisis with large deficits likely for the indefinite future, unless major reductions are made in government spending or federal revenues are increased. The rapid political changes in the USSR and Eastern Europe have led many people to believe that our domestic budget problems can be reduced, if not solved, by cutting back on defense spending.

As Soviet troops withdraw from East Europe, and as former Warsaw Pact armies shrink or become less effective -- we now have a welcome opportunity to reduce U.S. forces deployed in Europe. As arms control agreements are implemented, we will also have an opportunity to reduce spending on strategic nuclear forces.

But none of these changes make it desirable for the U.S. to dismantle our Navy. Our reliance on free use of the oceans has not diminished. In fact, oceangoing commerce has increased in recent years. For example, our reliance on imported petroleum is growing again.

Another reason to maintain a strong Navy is that while we see reduced Soviet ground forces, Soviet construction of modern, highly capable surface combatants and submarines continues without discernable change. Of course, the Soviets

could change their modernization plans, and some analysts already believe current economic conditions will force reductions in their next "Five Year Plan." Nevertheless, the ships being built now could limit our ability to use the seas -- if we do not maintain a strong Navy.

Finally, naval capabilities of numerous countries have increased dramatically in recent years. According to testimony before the Seapower Subcommittee, in addition to submarines operated by the U.S. and USSR, there are more than 400 submarines in the hands of 41 other nations.

In summary, a strong U.S. Navy that maintains a global presence continues to be needed to protect our interests around the world, notwithstanding changes in the Warsaw Pact.

The changing political and military situation, combined with a continuing budget crisis in the U.S. means we will not achieve the goal of a 600 ship Navy. More likely, there will be a smaller Navy -- but a Navy that is modern and highly capable. Reading the Post may give an impression that changes in Eastern Europe and the reduction in tensions between the Soviet Union and the West mean we no longer need to modernize the Navy. Programs like the new DDG-51 ARLEIGH BURKE destroyer and the SSN-21 SEAWOLF nuclear attack sub are suggested as candidates to be cut, apparently because someone believes they are no longer necessary. Meanwhile, Soviet capabilities have not been reduced -- and there have been no noticeable changes in Soviet naval ship construction.

But perhaps more to the point, high technology missiles and modern weapons are increasingly available throughout the world. You will recall that it was an EXOCET missile, used by Argentine forces in the Falklands war, that sank a British frigate. It was also an EXOCET launched by an Iraqi aircraft that severely damaged the USS STARK in the Persian Gulf. Technology like the EXOCET makes necessary the AEGIS weapon system, incorporated in the DDG-51. In a similar vein, the large numbers of diesel electric subs around the world pose a threat to operations of U.S. forces in the areas where these submarines operate. While diesel subs lack the rapid mobility and staying power of a nuclear submarine, they operate quietly and pose an effective threat to our Navy in

some circumstances.

The General Accounting Office addressed so-called "low intensity conflict" in a recent report. They went to some length to make clear that low intensity does **not** necessarily mean "low technology" or "low capability." Let me quote directly from the GAO report:

- *The range of potential situations and locations where U.S. Armed Forces may be called on to take direct action is global.*
- *U.S. Forces are confronted in low intensity warfare with an array of weapons that can have substantially different operating characteristics from the Soviet weapons they have been preparing to face in a major war in Europe.*
- *A so-called low-intensity threat is not necessarily a low-technology threat. The weapons U.S. Armed Forces may encounter in future low intensity warfare span the range of military technology that exists throughout the modern world; that is, it is not just poorly equipped opponents we confront.*
- *Finally, the weapons we face may be our own.*

Another obstacle that must be overcome is the proliferation of individuals and committees in Congress who have their finger in the Navy pie. Many of them try to identify problems in the Navy (and in ships and aircraft being developed and constructed for the Navy) -- but they don't always appear to take much interest in identifying real solutions to Navy problems and assuring that vital military programs proceed. I don't want to suggest that all criticism of Navy programs is inappropriate or that those that criticize lack patriotism. However, I believe that there is a responsibility to provide for the common defense, that the constitution gives that responsibility to Congress, and that carrying out that responsibility implies more than simply pointing out faults.

Under House rules, the Armed Services Committee is given the responsibility for our National Defense. The Armed Services Committee tries to carry out all facets of that responsibility, including:

- Providing for the welfare of the men and women who serve in the Armed Services;
- Providing the materials and weapons that are necessary for the Armed Services;
- Overseeing the activities of the military services.

Frankly, it's not unusual for tradeoffs to be made in carrying out responsibility for providing for National Defense. A current example involves the decision to go ahead with the construction of DDG-51 destroyers. Some point out that the first DDG-51 destroyer has not yet been finished or undergone operational testing. They seem to suggest no more orders should be placed until testing is complete. Taken separately -- and without considering the overall committee responsibility for U.S. National Defense, such a suggestion might have some merit. However, when responsibility for the welfare of men and women in the military is considered, and recalling that there are many nations in the world with EXOCET missiles, the importance of building the highly capable "AEGIS" ship (and getting it into the fleet) takes on greater importance.

To this point I've talked of general Navy and defense matters. Now I want to focus on submarine issues -- and the SSN-21 program in particular. I am a strong supporter of the U.S. Navy's Submarine Force as an effective and efficient element of our national military posture. While I believe there will be evolutionary change in the way subs are built and operated, I do not find merit in arguments that revolutionary changes will render nuclear powered submarines obsolete.

The suggestion that nuclear submarines, as we know them, will become obsolete comes either from suggestions that: 1) the oceans will somehow be rendered transparent, stripping the submarine of its stealth, or 2) from ideas that revolutionary propulsion technology will render nuclear power for subs obsolete. I will address each of these.

I believe acoustic detection will remain the principle method of detecting submarines for the foreseeable future. Periodically there are press reports that suggest submarines will be rendered ineffective by some technical breakthrough that will render oceans transparent, and submarines will become as detectable as surface ships. This speculation is usually related to satellite systems. It's only partly in jest when I observe that this speculation always seems to occur about the same time Congress is considering whether to proceed with some new land-based ICBM.

Nevertheless, there is always the question of whether some new, previously unknown technology will render the ocean

transparent and deprive the submarine of the stealth that has made it such an effective military platform. Research into non-acoustic methods of detecting submarines is being vigorously pursued, and history suggests it isn't prudent to say that no new ways to detect submarines will be discovered. We already know submerged subs can be detected by non-acoustic means in limited circumstances. For example, submarines operating at shallow depths in clear water can be seen by the naked eye from an aircraft.

A different type of detection in certain areas of the world is the visible wake from a submerged submarine as a result of "bioluminescence." I'll admit I wasn't real sure about "bioluminescence" until I re-read The Rhyme Of The Ancient Mariner:

Beyond the shadow of the ship
I watched the water snakes
move in tracks of shining white,
the light fell off in flakes.

When he adds, *within the shadow of the ship, every track was a flash of golden fire*, a reader might wonder if the Ancient Mariner saw a submarine.

Notwithstanding these examples, submarines remain very stealthy platforms with enormous military utility. In sum, while we cannot ignore non-acoustic detection, it should not prevent us from proceeding with the SSN-21. For purposes of discussion, let's assume acoustic detection will continue to dominate anti-submarine warfare. If we further accept that SSN-21 incorporates major strides in sub quieting, we cannot, in my view, conclude that the future of ASW will be as it has been in the past.

Submarines that SSN-21 is being designed to operate against will be **much** quieter than submarines that today's 637 and 688 submarines operate against. Even though the new SSN-21 is expected to maintain an acoustic advantage over the submarines of potential adversaries, it will not enjoy the ability to detect adversary submarines at long ranges, simply because the adversary submarines will also likely be very quiet.

Shrinking acoustic detection ranges will force fundamental changes in submarine operations. This point was made

forcefully in the report of a panel of distinguished scientists convened by the Armed Services Committee to review submarine issues. Submarines performing an ASW mission will have to operate differently in the future. One submarine, operating alone will be of limited effectiveness in finding adversary submarines. Rather, the Submarine of the future will need the ability to operate as an integral part of a larger system that relies on the fusion of intelligence collected from numerous sources to provide locations of target submarines.

The submarine force of the future will need regular and reliable two-way communications to operate effectively. Crews will have to develop new tactics. Coordinated operations will be essential, and new ways to command and control submarines will have to be implemented. The challenge of designing and building a new submarine command and control system is to provide real time communications without compromising secrecy or stealth.

I want to turn to propulsion technology. The Navy focused on pressurized water nuclear reactor technology during virtually the entire history of their nuclear power program. That focus allowed continuing improvements in safety -- and in the durability and reliability of Navy nuclear power plants. The Navy's record is of extraordinary achievement, unparalleled safety, and outstanding performance. Notwithstanding this record, there are those who suggest that substantial improvements could be achieved through developing new naval reactor technology, or by developing chemical propulsion systems, such as fuel cells. The issue has some parallels with the non-acoustic detection issue -- although it is always unwise to dismiss the possibility of some future breakthrough, the technology available today does not have general military utility.

Critics of the Navy Nuclear Power Program criticize it for being overly conservative and not receptive to new ideas. The suggestion is made that, but for the conservatism and closed mind, United States submarines could be smaller, less costly, faster, and more effective. The suggestion is typically made that this could be achieved by substituting a high temperature gas cooled reactor for the pressurized water reactor currently used.

For the past two years I've served on the Armed Services Committee panel charged with oversight of the nuclear weapons complex. I'm sure you're aware of problems at Energy Department facilities that produce nuclear weapons. Environmental problems at DOE plants, and concerns about safety at DOE nuclear facilities lead to critical facilities being closed. Today, nuclear weapons production in the U.S. is at a standstill.

I'm discussing this to make two points:

- Public confidence that the nuclear weapons facilities are being operated in a safe and environmentally sound manner has been lost. Yet public confidence in the operation of the Navy's nuclear powered ships continues to be high, and these ships routinely operate in world ports.
- Public confidence can be maintained only if the systems can be demonstrated to be safe and reliable.

In my view, there's a direct link between the careful design and engineering decisions that led to choosing and improving pressurized water reactor technology and the track record of safe and reliable operations. Experiences with DOE nuclear weapons facilities, as well as the Soviet disaster at Chernybol, show just how fragile public confidence can be. The continued operations of nuclear powered ships around the world, and their ability to carry out a military mission, depends upon public confidence.

Another suggestion made is that the U.S. Navy should build chemically powered submarines. The diesel electric submarine is proposed because of lower cost. It is also suggested that air-independent conventional submarine propulsion may be in the offing -- perhaps a fuel cell or an external combustion engine. Compared to nuclear power, all these options have very limited submerged range and high speed transit capability. Our strategy is to fight in forward areas, and that requires long range and rapid mobility to carry out. The alternatives to nuclear power aren't capable of supporting that strategy. And let me add: I strongly disagree with those who suggest that this element of our military strategy should change.

I think we can forget the idea of "large-lot procurement" in the President's budget. Like it or not, there's no way Con-

gress will support procurement of six SSN-21 Submarines in a single year. Budget pressures that result in a smaller Navy mean that the building rate for the SSN-21 is extremely unlikely to reach three submarines per year. A defense budget at the level of the House budget resolution has already caused many people to question the authorization of two SSN-21s in 1991. I think that's a battle we can win -- but it won't be easy. What we need to do is continue to earn public confidence and support by emphasizing safety, reliability, and a reasonable appreciation of the changing situation in Europe.

In sum, I believe submarine strategy will continue to evolve, with more emphasis on integrated operations, and more dependence on external command and control. But I also believe the SSN-21 is the submarine the U.S. should build today. The SEAWOLF will provide a platform to accommodate currently emerging technology, as well as effectively respond to emerging threats to the security of the United States.

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ADDRESS BY
DIRECTOR of DEFENSE RESEARCH & ENGINEERING

Dr. Charles M. Herzfeld

It's a great honor to be here and I want to thank Admiral Long very much for his very kind introduction. I feel very much at home in this particular community of sailors because for almost 20 years I have been a student of Admiral Long's. I have had the privilege of being associated with him in a variety of interesting tasks. I was exposed to a great deal of his wisdom and experience and knowledge and I hope that you will find that I was a good student.

I want to talk about a number of rather important matters. The world has changed and is changing a great deal and this will impact our military posture. We need to talk about how the United States defense technical community should respond to these changes; some trends in the U.S. science and technology program; and I do want to say something about the U.S. forces of the future.

The changes are really worldwide that we see but they are not completed. It is simply too early to say where it will all come out. The one thing we should agree on -- it's not going to be a particularly safe time. I think the people who think that are not remembering history. The things that have started to happen in various parts of the world, such as the Soviet Union, are potentially very dangerous evolutions because change, rapid change and dramatic change involve risks, and we are to remember the Soviet Union remains, as Secretary Cheney is fond of pointing out, the only country in the world that can destroy the United States in one hour. And no matter what agreements are going to be signed, it will remain the largest military power in Eurasia for probably as long as we live, which I hope to be a good long time.

Proliferation of high technology weapons to potentially hostile nations poses serious problems to this country. For example, in the next decade some 30 countries will have chemical weapons, 10 will have biological weapons, 15 will produce or own ballistic missiles of some significant range, and five or six are working on acquiring nuclear capabilities. Unfortunately, the same countries are on all three lists, so you

are faced with some significant threats in the future.

As far as this community is concerned, there will be many modern submarines that are not Russian. The air independent propulsion submarines will be hard to detect; they will be hard to track; and there will be real problems to be sure. The range will probably be limited, and I think we need to hedge a little to think about it.

Mr. Cheney and others have pointed out that our defense strategy must be based on technological superiority because we must make up in quality what we cannot match in numbers and we must be committed to that, and I think this community is fully committed. There will be cuts in defense spending. This is absolutely certain unless something strange or very dramatic or untoward happens. And the real issue is how to handle this and what kinds of reductions to make. There will be serious reductions in force structure. I don't think there's any question about that.

One of the interesting evolutions that comes out of this is that I think it is likely that for the next 20 years or so we will not be building very many new large platforms, or large numbers of any kind of aircraft or ships or tanks or whatever. We will be working a long time on systems we are developing now, including SEAWOLF of course, with the aircraft we are developing now, and the land vehicles we have developed. The emphasis therefore, will shift to improving these platforms and upgrading the systems they carry -- the sonars, the weapons, the electronics, the communications, the countermeasures suites. And I realize with increasing satisfaction that the people who are designing the current platforms are taking this more into account than they used to so that it will be easier to make significant upgrades. You will not have to rip the whole platform apart to put a new major subsystem in. I think it's terribly important and I think it really represents what's called a paradigm shift, a major shift in how we look at things. For the next 20 years at least, it is not likely that we will be back in the days of the 60s or 70s or even the 80s when we started many platforms sort of simultaneously and from scratch. There were no old bolts or screws in the new one from the old one. I think those days are gone for awhile, and the faster we adapt to this and the faster we exploit the

potential of that situation, the better off we will all be.

One of the major functions of the technology community will be to make available the options that will be needed for these upgrades. To make them available in time, to make them available in a manner that is appropriate to their use and a manner that makes their use affordable. Those are difficult challenges and my action plan for the next few years is to try and set us on this course. In this way we have to support the submarine community with the best we can put together and that can be put into the platforms and that will be affordable.

One important aspect of this is that I think we will want to emphasize more manufacturing technologies and training technologies. I think there is a great deal of money to be saved by using modern techniques of computer aided instruction and simulation as training systems. While nothing will ever replace at-sea live firings with our systems, I think the preparation time for these events can be reduced and made more manageable, and it will be easier to measure actual performance, all of which will be important.

Let me now make a couple of comments about submarines in the future. We've been on an evolutionary road ever since the first nuclear submarines were built. That in itself was a revolution. This evolutionary approach has been good for us. I think we did things in an orderly manner and we got tremendous capabilities. We got good numbers of ships this way, and the important thing about the SSN-21 is that it continues this trend. Many of the detractors or critics do not take into account that building on a solid base is worth a lot in terms of time saved and trouble saved. Now, we must get enough SSN-21s and there is a great deal of debate going on about what enough is. I don't plan to get into that here.

The next set of questions that I do want to spend time on here is what do we do after the SSN-21? Let me remind you that I am trying to look at this with a 20 year time horizon. Designing and building a really new ship or big platform of any kind, particularly a submarine, takes a long time, 10 to 15 years from the start to when the first one gets wet. I think we should start thinking about what it is we want after we get the complete run of SSN-21s, and how do we get there. So the question is, **when** and **how** do we get started? I don't

think it's too early to ask these questions. I think there is relatively little danger in asking these questions now, that doing so will undermine the production of the SSN-21 because we would have a terrific hole in our capabilities if we didn't fill this hole with the SSN-21.

I'd like to raise the question, but not really answer it: what will be the role of the submarine in the 21st century? Let me concentrate on the attack submarine world rather than the ballistic submarine world. About two years ago, the Navy asked the National Academy to do a study called Navy 21. Admiral Long and I were involved in this, and served together advising the study. The study grappled with this question -- what will the future of submarines be in the next century? -- and you can imagine the wild swings of opinion that were expressed and were debated. And the real question comes out -- will the submarine be the "real" capital ship of the Navy? Some said yes, others said no, and still others said maybe. My view is that it will be "a" capital ship but not the only one. The demands on the United States Navy will remain so diversified into the next century that a single class of capital ship, no matter what it is, will not be able to fulfill our security requirements, but the modern submarine will be one of the main platforms for exercising naval power in the 21st century. Some opponents say surface ships will be vulnerable because they will be easy to detect, much easier than submarines under any circumstances that are reasonable, and we should not be confused about that. On the other hand, aircraft carriers, which I hate to mention in this company but will, can do something submarines cannot do. For one thing they present a fearsome appearance and sometimes that's very important. And so I believe in the next century we will wind up with several types of capital ships.

How are we going to find out what kind of submarine we really would like to have after the SEAWOLF. I think we should build models, small ones. We are already doing that. We may want to get back to an era where we build a very small number of carefully thought out experimental submarines that can really go into open ocean and show their stuff. That's terribly expensive I know. These things cost half or a quarter of a real submarine, so to say. On the other hand, I

think the question is important enough that we ought to think about persuading the country to do that. I'd like to see how far we can expand the envelope of operations of genuine true submarine ships -- how fast they can go, how deep can they go, how quiet they can be made, how undetectable they can be made, how many weapons we can hang onto them. What is the right kind of ship construction? Multi-hull or single hull? I think we may find, in the future, real reasons for double hulls. And I believe that, in addition to what we can do in the laboratories and with the **small** models, the construction of one or two, quite different, well thought out, advanced technology submarines that are experimental submarines would be very instructive.

There will be spinoffs of other applications in other ship types, to unmanned vehicles and others. I think these big models should not be driven by mission goals, but by technology goals to see how much can be done on one platform in one dimension or two, say, speed and depth, or speed and quieting. The possible combinations are quite rich here.

The time is coming where we need not only research on new materials and new subsystems but also on the concept of how we build submarines, how we design them. I believe we can work on better ways to construct them. I think we've learned a lot about building surface ships in the last 20 years. We've also learned a lot about building submarines. I think there are further opportunities we need to look into.

Another dimension concerns the increase in the operating life of submarines significantly, to cut down on the number of overhauls and reactor refuelings. Can we do something really significant here? I don't know, but I think it's a challenge for all of us to find out because if we can, it would make our ability to field a strong and effective force very much better.

So my bottom line is: as time goes on, the submarine community most likely will become more important, not less. It will need better ships, and more, (and it is getting better ships but at the moment, fewer,) as far as the long run can be predicted. Can we do things that will enable us, after the class we're building now, to build a ship that is better, that we can afford to build more of, or that we keep longer in service without giving up performance?

We have a very full agenda here, to study, to simulate, to game the utility of the submarine's different capabilities, to find out the really good combinations of the capabilities we think we can get. What are the best tradeoffs? We need another round of studies for the next generation. And only when we are satisfied that we have a really good mix should we begin to design the next platform. It's a very long process; it takes 10 to 15 years. So when I am asked, "When do we start?", I answer, "Why, right now, of course!"

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BATTLE OF THE ATLANTIC

Dr. Robert Denney, Ph.D., Manager, Office of Conferences and Special Programs, Division of Continuing Education, East Carolina University, Greenville, NC 27858-4353, has advised NSL of a conference concerning combat activity off the coast of Virginia and North Carolina during the first half of the year 1942. This **BATTLE OF THE ATLANTIC** conference will be held 22 and 23 February 1991, at the Sheraton Hotel, Virginia Beach, Virginia. During the two day conference, various speakers will address a wide range of subjects related to the Eastern Sea Frontier Campaign from both sides of the battle. Program examples: Dr. Jurgen Rohwer will speak on: **"The German U-Boat War and the United States Atlantic Fleet from 1941 to June 1942"**; Homer Hickman will speak on: **"Torpedo Junction: The Book and The Battle."**

Others will address ASW aspects, underwater archeology, shipbuilding in North Carolina, experiences and observations by Outer Banks residents, etc. For more information and to obtain conference brochures, contact Dr. Denney at the address above. The telephone number is (919) 757-6143 and the telefax number is (919) 757-4350. This should prove to be a very interesting and informative conference and of particular interest to submariners.

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ADDRESS BY
DIRECTOR NAVY NUCLEAR PROPULSION

Admiral Bruce DeMars, USN

Today I want to focus on a signal subject: **SSN-21, SEAWOLF!**

As in any endeavor of this magnitude, the SSN-21 program, despite a broad base of support, has had its share of issues. Some are valid concerns, most are not. I want to make two points:

- The SSN-21 is absolutely essential in order to preserve our undersea superiority and it remains logical and cost effective even in these changing times.
- Two SSN-21s in this year's budget are critical to sustain a highly specialized, fragile industrial base.

Having triumphed over the Soviet communist system, in both the economic and military arenas, current debate is focused on how much for defense and how fast can we realize the peace dividend. But, in restructuring our country's military, we must consider what fundamental capabilities led to this improved state of affairs. Heretofore little known, under-appreciated, and cloaked in secrecy, the role of attack submarines needs to be well understood in the context of today's difficult decisions.

For the past four decades the submarine force role has been focused on two goals:

- To provide a credible, stabilizing strategic nuclear deterrent with the strategic submarines, and
- To be always prepared to defeat the Soviet Navy in a conventional war with the attack submarines.

While the strategic submarine story is an impressive one, I will only address the SSN. We invented the nuclear attack submarine and it changed the course of naval warfare forever. One of the most brilliant and successful engineering developments in history, NAUTILUS was the product of concurrent design and construction.

In 1948 Dr. Oppenheimer, technical director for the Manhattan Project reported to the Atomic Energy Commission that it would take fifteen years to develop a nuclear-powered submarine -- five to produce a test reactor; five more for a

land based prototype shipboard reactor; and another five to deliver the ship. Admiral Rickover, then a Captain, had a bolder approach. By proceeding in parallel, he was able to put NAUTILUS to sea in January 1955 -- only seven years after Dr. Oppenheimer's report.

Concurrency in design and production, one criticism of the SSN-21 effort, is exactly what led to the extraordinary success of the NAUTILUS program. The accelerated schedule actually saved money. As Admiral Rickover correctly observed: *It takes time to spend money.*

This aggressive program gave us an initial five year lead on the Soviets from which they never recovered. For the past 35 years, the Soviets have lagged behind as we built successive classes of ever more capable SSNs: SKATE - SKIPJACK - PERMIT - STURGEON - LOS ANGELES. The Soviets built over twice as many different classes of attack submarines in the same period. But ours continue to out-perform theirs.

We countered their every move. As they got quieter, we invented a towed array sonar and changed our tactics. When they went deeper and faster to compensate for lack of stealth, we modified our torpedoes to go deeper and faster; and we let them know we did it.

When they deployed to the Mediterranean in the 60s, we followed. When they went to the Indian Ocean in the 70s, we followed. When they went under the Arctic ice pack to escape detection, we increased our Arctic deployments from 1 sub per year to 3-4 per year.

The Soviets made their submarine force the centerpiece of their post-World War II naval expansion. But we hounded them unmercifully. They always came out second best.

Our submarine programs have been one of our country's most successful Cold War competitive strategies. Reacting to the pressure of our strategic and attack submarines, the Soviets had to commit vast resources in pursuit of undersea superiority; or at least parity.

This kind of unrelenting pressure on resources was instrumental in the Soviet decision to try a different tack. But the Soviets are not throwing in the towel. Although encouraged by changes brought about by current Soviet leadership, we have to evaluate what they actually do.

They are finally starting to retire some old and obsolete submarines -- mostly diesel boats. They have not retired any submarines even remotely equivalent to those we have been retiring. They have not halted construction on new ships nor their commitment to improve them. As reported in the recently released edition of Jane's Fighting Ships; in terms of tonnage, more submarines were commissioned in 1989 than in any year since 1980. I am confident they will introduce several new improved submarine designs within this decade.

All this is not surprising. Because submarines are so versatile and cost-effective, they generate the most return for the investment. Other emerging nations with limited budgets want to acquire nuclear submarines for the same reason.

Admiral Gorshkov, the father of Soviet seapower, said it well: *For each German U-boat, there were 25 British and U.S. ships and 100 aircraft, and for every German submariner at sea there were 100 British and American anti-submariners.* He concluded that if diesel submarines with only limited mobility and endurance could have this effect, nuclear powered submarines could tilt the scales even more sharply. He was right.

In many circles today, the Soviets are no longer viewed as even a potential threat. But as long as the capability exists, we cannot ignore it. We cannot afford to get so caught up by the charisma of one leader that we voluntarily close the gap that they could not close otherwise. Our submarine advantage will continue to be important to our national interests. We need to preserve this submarine advantage to deter changes in Soviet intentions. The SSN-21 will do this.

But what about the use of these high tech vessels in actions short of World War III? Actually, their worth becomes even more important as we have to get by with less. A smaller Navy, coupled with base reductions overseas, creates a greater requirement for single ships operating alone that can project U.S. influence.

Our nuclear submarines have stealth already paid for. This becomes increasingly important as high tech weapons move rapidly into third world nations. Our submarines are cost effective; a characteristic that derives from small crew size, the submariners' traditional disdain for trappings, and the natural

defense provided by the ocean depths. Stealth is their protection; the payload is all offensive power.

Of course, our attack submarines do not meet every need. They are not a strategic deterrent like TRIDENT submarines. They do not begin to have the firepower of our aircraft carrier battle groups. They would not be a good choice to protect convoys from small boats or air strikes in the Persian Gulf. But if you want lethal sea control or to carry out surgical strikes ashore, our nuclear attack submarines can do the job -- without committing carrier battle groups and without risking loss or capture of pilots.

As the number of carrier battle groups decline, the attack submarines with cruise missiles will have to pick up the slack. More thought must be given to the submarine presence mission. While we all know that seventy percent of the world is covered by ocean or sea, it is not common knowledge that within 200 miles of a coast lives seventy percent of the world's population -- within 300 miles are eighty percent of the capitals and ninety percent of the manufacturing commerce of Western Europe and the Pacific Rim -- all well within the range of a submarine launched TOMAHAWK land attack missile.

We are building SEAWOLF because we need its improved capability to sustain a commanding edge over all others and to fulfill a variety of missions. The STURGEON and LOS ANGELES class remain effective for many missions. But they cannot handle what we see in the future undersea technology race. SSN-21 is absolutely vital in maintaining undersea superiority.

There is another compelling reason to get on with the SSN-21 program -- the industrial base. The ability to design and manufacture nuclear powered warships and their sophisticated hardware depends on a small, highly specialized, and fragile industrial base. This base has already been hit hard by early termination of the LOS ANGELES class program; by early retirement of other SSNs; by the approaching end of the TRIDENT authorizations; and by the growing recognition that the building rate for the SEAWOLF class will be less than planned. Budget uncertainty amplifies the problems.

Because of the Navy's strict requirements for high quality,

long-lasting, shock-resistant, quiet-running submarines, very few off-the-shelf components can do the job. For the most part, the Navy is the only customer for these components. This is not the aircraft industry. Quantities are small. Overhead is high -- the result of extensive quality organizations, cleanliness procedures, and management structures required to turn out this kind of work. Companies who carry this burden rarely are able to compete successfully for less sophisticated civilian work. With the demise of the civilian nuclear industry and the long lull in electrical power generation orders, there is little in the way of other work to tide these firms through gaps in the shipbuilding program.

The problem exists in shipyards, in nuclear component factories, and among specialty suppliers at lower levels. In terms of reactor plants to be ordered, the projection for the 90s is about half what it has been for each of the last two decades. In the past year, we have lost our alternate supplier for nuclear fuel and our alternate supplier of nuclear cores. Other major equipment suppliers are hanging on the ragged edge.

Twenty years ago Congress rejected a DOD proposal to stop submarine construction with the STURGEON class. Recognizing the importance of underseas warfare, and the need to sustain a viable nuclear industrial base, Congress authorized an aggressive building program for the new LOS ANGELES class. Where would we be today had Congress not taken the long term view?

Of course, Congress should not authorize unneeded ships just to sustain an industrial base. But with a 30 year shiplife, a building rate of only two submarines per year corresponds to a forty percent reduction in submarine force levels. From the standpoint both of military need and industrial base, we need both SSN-21s in the President's budget.

The inexorable advance of technology has greatly expanded submarine missions. Over the past eight decades the submarine has moved from naval oddity to successive preeminence in anti-surface ship warfare, anti-submarine warfare, and strategic nuclear deterrence. The nuclear submarine has the most to gain with technology that is now at hand. The continued development of cruise missiles, satellites, and

unmanned underwater and flying vehicles added to the tremendous capability inherent in SSN-21 will cause the nuclear submarine to be recognized for what it is today -- the capital ship of the Navy.

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STS 91

The 1991 Submarine Technology Symposium (STS 91) will be held on 7, 8 and 9 May 1991 at Johns Hopkins-Applied Physics Laboratory in Laurel, Maryland. Attendance is by invitation and is restricted to those having a Secret-NOFORN clearance and certified need to know.

The STS 91 theme is **SUBMARINE TECHNOLOGY FOR LOW INTENSITY & THIRD WORLD CONFLICTS.** The symposium will address those technologies which have the potential for enhancing the role of the submarine in limited objective/low intensity warfare, i.e., general warfare beyond direct involvement with the Soviet Union.

Members interested in applying for participation as a speaker should contact Mr. G. Richard Thompson, STS 91 Program Chairman, at (301) 953 5396.

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CONTINUING ROLES FOR STRATEGIC DETERRENT FORCES

by RADM W. A. Owens, USN

Any discussion of TRIDENT in today's world needs to include an understanding of the highest policy considerations of government. It starts from how we view the Soviet Union. The Soviets have, of course, undergone dramatic changes in their society. But few of us realized how absolutely bankrupt the systems of Communism and Marxist economy were. Many of us thought that the Soviet Union, while not providing the same standard of living as we had, certainly was, to a great extent, successful in building a formidable military, successful (as the CIA and others told us) in small but continued economic growth, and successful in at least maintaining a stable social system in which to live. We read that their crime rates were lower than ours and that their security on the streets was better than ours. It seems to have been a surprise to us to see their whole system crumble. How genuinely surprised most of us were that our system truly had won! Now, the question is how to manage that success.

As we undergo the various arms control talks, we see dramatic changes in the balance between the United States and the Soviet Union. But as time goes on, we are coming to appreciate the fact that while we've had dramatic revolution in the Eastern bloc, with all Eastern European governments, except Albania, having been replaced by democratically elected governments, and while most European economies seem to be taking at least the initial steps necessary to develop market economies, in many ways the situation has not, since World War II, been more **unstable** on the Eurasian continent. We see the Soviets dealing with **significant** nationalities problems ranging from Moldavia to the Baltic States, to Adjerbijan, Armenia, in Usbekh and in Kirzakh. These nationality issues have existed since the establishment of the Soviet Union, but have been released as constraints have been removed, and we see the Soviet economic system crumbling.

People stand in lines to get their basic food stuffs for an average of ten hours every week. How long can the situation go on? While Eastern Europe certainly is on the road to

recovery, there is some question that the Soviet Union is quite as well along its way. These instabilities come back to the one central feature of this presentation: that Soviet **super power status** has, over much of time since World War II, and will continue for the rest of our lifetimes, to **depend on strategic weapons and defenses.** That is a central fact that we as a country must keep in mind as we react with our own strategic offensive and defensive forces.

The Soviet Union has continued to modernize and upgrade its strategic arsenal at a time when we have been far less resolute about our own. The Soviets have, for instance, deployed over 60 SS-24 rail- and silo-based missiles, and continue to produce this formidable system. They have deployed 200 SS-25 land mobile ICBMs, and have continued to pour research and development funds and procurement rubles into their sea-based systems. In the last year, the Soviets have built 140 modern precise intercontinental ballistic missiles as compared to 12 in the United States. And the Soviets have built two SSBNs during the last year compared to one in this country. The projected building rate for the Soviet submarine force will continue to be at least one or two SSBNs per year, while in our country the POM that was leaked to the press shows that our Navy could shut down production of submarines at the presently authorized number of eighteen. Even though the Soviets have the SS-24 and SS-25, the prospect of us building a mobile ICBM system is disappearing because of the budgetary and political realities of Washington.

We have been attempting for years to come to grips with the land based ICBM leg of our TRIAD, with options ranging across the spectrum from putting ICBMs on various vehicles to the mobile-missile shell-game of the Carter administration, to the present rail mobile MX or small ICBM. In the bomber leg of our TRIAD, we have been successful at least to date, in protecting B-2 at some number, presently 75. The Soviets have continued to build intercontinental capable bombers and will have a formidable bomber force at the turn of the century. While they claim the BACKFIRE bomber does not have intercontinental capability, the addition of a refueling probe, coupled with their growing refueling capability, is reason to believe that their capability could be changed very quickly. In

sum, the Soviet strategic forces are significant and will remain significant in the future. We, on the other hand, seem to be considerably less resolutely on the track of maintaining modernized and sufficient nuclear forces.

Secretary Cheney said in his 1991 budget testimony, *We should not expect the Soviet Union to give up the only national instrument that makes them a super power: their substantial nuclear forces.*

For us it will continue to be very difficult to come to easy decisions on the U.S. TRIAD. We are faced with uncertainty in the structure of our TRIAD just at a time when we need to rely on it in this somewhat uncertain world. The word "TRIAD" is an element of history which has come to be accepted, without argument, as a rationale for the construction of our nuclear strategic forces. Distribution of weapons is a matter of degree, as we see the numbers shifted to the SSBN leg because of survivability and cost per RV which is lower for the SSBN than for either of the other two legs of the TRIAD. As most of you know, we have put 50% of the total warheads in the TRIAD on SSBNs for 25% of the total cost. With the uncertainties facing modernization of the ICBM and bomber legs, we must conclude that greater reliance will be placed on that keystone of our deterrence; TRIDENT. With the advent of D-5 we are ready to take on that challenge.

I'm struck by Arleigh Burke's comment *I never saw a cowboy wearing three guns.* To some extent, for cost and other considerations we find ourselves perhaps wearing more like two guns than three as we look to the future.

I want to present to you a few of the findings of some work that the CNO Strategic Think Tank did a couple of years ago. The work is relevant to today's situation. You will recognize this to be **not approved by the Secretary of the Navy or the CNO,** and is purely the effort of a small group of fellows working in the Think Tank with me.

The traditional view of the strategic submarine force has been that it is the most survivable, that it provides ensured inevitable response, **but** that SSBNs are less accurate than ICBMs and bombers, that SSBNs are not as alert as other forces, that communications with SSBNs are less dependable, that SSBNs are less prompt than ICBMs, and that SLBMs cost

more. These views permeated official thinking about our strategic nuclear forces for over two decades. They have also driven operational planning and targeting. In part, at least, these have been accurate descriptors of our force and have been reflected in the way the nation plans for the horrible possibility that deterrence may fail.

In general, ICBMs have been considered the hard target, time-sensitive-target weapon, while SLBMs are launched against other less-time-sensitive and less hard targets. The point of this is that the attributes ascribed to the SSBNs in the past have been more than rhetoric. They have driven planning, and in turn peacetime operations, and these attributes have conditioned our thinking about strategy and force requirements as well as arms control. To the extent that these descriptors are **wrong** we must reflect the change across all dimensions of the strategic force. Of course the assumptions about SSBNs are very likely to change because the technical capabilities of the system have changed in a revolutionary way. Within a few years, our SSBN force will change from one currently composed of two different kinds of submarines armed with three different kinds of missiles to a smaller, all-TRIDENT force armed with a single missile, the D-5. It is not too early to suggest how assumptions about the SSBN force will change as a result. For one thing, the general view about accuracy and lethality will almost certainly shift as perceptions catch up with the evolution of the SSBN system, in particular, as the hard target kill potential of D-5 is recognized. The possibility of destroying the most threatening Soviet ICBMs(SS-18s) from any of the TRIDENT patrol areas, (which are roughly 3 times the size of the entire Eurasian continent) will give the Soviets room for thought as they consider any potential use of their offensive strategic missiles. TRIDENT D-5 with its lethality equal to or greater than PEACEKEEPER MX, and with its survivability, offers additional elements that cause it to be considered differently from ICBMs. For instance, the TRIDENT can operate from different areas around the periphery of the Soviet Union. These thousands of different missile attack profiles from essentially all directions and different reentry angles make it very difficult for the Soviet Union to devise a concentrated

ABM system since ABM systems are normally focused on a given threat direction. By being able to shoot our missiles at different ranges, we are offered the ability to target not only azimuth but entry angle to allow the RVS the greatest possibility of thwarting an ABM system. In sum, the distinction which previously had been drawn between SLBMs and the other two legs of the TRIAD, in terms of accuracy and lethality will, quite simply, in the future no longer be valid.

The changes in the TRIDENT D-5 also should change perceptions about alert levels (how soon the force could be available for use). The prevailing view is that SSBNs are considerably less alert than ICBMs: that is; that a smaller portion of the total force is immediately available for use. But the improvements in range and accuracy could eliminate that perception. In the past, the submarines carrying many of the over 5,000 SLBM warheads at sea may not have been in constant communications or located within the range of assigned targets. They were therefore not considered to be alert weapons. In the past we have operated our SSBNs in areas closer to ports to allow training and routine evolutions and hence these weapons were not available as quickly because of range or accuracy limitations. In terms of force alert rates, there have been real differences in SLBMs and ICBMs. Over ninety percent of the ICBM force could be launched in less than twenty minutes from the decision to launch. But a far smaller percentage of the SLBMs could be launched in the same time on any given day under normal conditions. In a few years with an all TRIDENT D-5 force, this view will have changed. The TRIDENT submarine will stay at sea longer, have a shorter in port fitting out time, and be committed to overhaul less often. So the at sea portion of the force will be larger. Because of the greater range and accuracy of the weapons carried, there is no physical reason why all the warheads at sea could not be available to launch within just a few minutes of the NCA command. Indeed, if pushed, there is no physical reason why most of the warheads on board TRIDENT submarines **in port** or **at sea** could not be considered alert and could not be available for launch. In effect, then, the difference in alert rates between the SLBMs and the ICBMs is a declining commodity. In the future, the assump-

tion that SLBMs are less alert will fall from discussions of nuclear strategy.

What about the differences in promptness? That is to say, how long will it take SLBMs to destroy a target compared to an ICBM? As long as SSBNs had to operate relatively close to the Soviet Union to be in range of the target, planners generally drew an important distinction between how soon targets could be destroyed by SLBMs and ICBMs. The difference was due primarily to how long the planners thought it would take for the launch message to burn its way through jamming and nuclear effects and pass through the relay systems necessary to get it to the forward deployed submarine. With longer ranged missiles the SSBN is able to operate effectively closer to the United States and further from Soviet jamming. Additionally, communications coverage from NEACP, SAC airborne command post, and TACAMO has become much more effective in difficult communications environments, either stressed by jamming or other effects. The result is that, in the future, our submarines will be able to operate effectively within communications range of a reliable transmitter, and receipt of launch commands will not only be more reliable but faster. The end product of these changes should be a major shift in perception regarding the promptness of SLBMs and ICBMs. The Strategic Think Tank came to the conclusion that the difference in promptness was truly marginal.

Then there is the crucial matter of cost. When constructed, the TRIDENT was generally considered a very expensive, if not the most expensive part of the TRIAD. In part, this was because it was compared to MINUTEMAN missiles and B-52s both of which had already been bought. Now TRIDENT has matured and its costs are likely to be compared with new land-based systems whose modernization will be relatively expensive. Since total acquisition costs for small ICBM or rail mobile MX and B2 are somewhat uncertain, it is difficult to make a valid comparison. But it is fair to say that, if one were to compare alternate ways of getting 500 modernized survivable nuclear warheads into the strategic inventory, TRIDENT would be far the least expensive way: certainly no more expensive than to procure and deploy 50 MXs on rails or to procure the 30 B2 bombers necessary to do so, or the 500 small ICBMs; cheaper

than the latter two by factors of two to five. Operating support costs would vary, of course, but the days in which those costs were dramatically higher for SSBNs are gone. In the future the cost debates will start on very different assumptions than they have in the past. In the future, shifts in perceptions about SSBNs will not be driven simply from technical improvements. The shift will also come from the way in which these new capabilities interact with how we deploy our general purpose forces. That is, there is a profoundly important synergism between the inherent capabilities of the SSBN force and the maritime strategic context under which it will be employed. The way we plan to deploy our forces changes the Soviet view of the correlation of nuclear forces not only by narrowing their options, but by expanding ours and enhancing the potency of the SSBN force.

Seen geopolitically, the forward operations of maritime forces create what could be called U.S. strategic "bastions" out of the worlds oceans. These are roughly analogous to the Soviet strategic bastions, but only in the sense that they are the area in which it would be very difficult for an opponent's forces to conduct combined arms ASW. Unlike the Soviet bastions, ours would be vast, encompassing virtually all of the world's oceans. For any submariner, it becomes apparent that to enter a bastion is a very difficult chore. For the Soviet to enter our "bastion" for instance, he must travel through some of the world's most capable ASW forces in the Norwegian Sea, go through a plethora of fixed and mobile ASW systems in the North Atlantic, and finally enter the broad ocean areas where he is more vulnerable than we are, and where our surveillance is poised to detect any intruder. It is also apparent that, with our SSBN operating modes, we will always be in a situation to avoid rather than encounter him, given any alerting information. The vastness of these bastions, coupled with the capacity of U.S. and allied navies to deny them to Soviet surface ships, aircraft, and submarines in a conflict, enhances the survivability, endurance, lethality, and availability of the SSBNs in several ways. It makes access to a plethora of ports a reality and replenishment at sea safe. It allows the SSBN to challenge Soviet planners with an almost infinite number of potential attack profiles, and it limits the capacity of the Soviet

Union to make use of any as of yet unforseen technical breakthroughs in their ability to detect or track the SSBNs on patrol. Indeed, based on a series of calculations of what difference the maritime strategy makes to the survivability of U.S. SSBNs, I have become convinced of the following: if you will give me the assumptions that SSBNs are and will be as quiet as Soviet SSNs and that U.S. surveillance is equal to Soviet surveillance, then I would offer the somewhat startling conclusion that there **could never be** a forcewide threat from Soviet ASW forces in our bastions. Like all analytically derived conclusions, this one depends on the assumptions, but I think these assumptions are conservative, and they give the benefit of the doubt in every instance to the Soviets. The conclusion, sweeping as it is, means the much touted **but not yet identified** Soviet ASW breakthrough is considerably further from reality than now understood by general audiences.

The relationship between the deployment of maritime forces and strategic connectivity is worth noting also. Some assessments of the last few years have concluded that connectivity from the NCA to our SSBNs is as good as any other leg of the TRIAD. But I would offer that it may be **better** with SSBNs than with either ICBMs or bombers. In a protracted conflict where fixed site command and control communications nodes are destroyed, surviving nuclear forces may have to depend on **mobile** communications to relay launch commands. We have at sea a mobile ground wave relay capability which is generated by the deployment of the fleet in a conflict. This communication net potential inherent in the several hundred ships at sea in the fleet and available to the TRIDENT D-5 system is most important. In the kind of situations where in-depth communications may be the only way of reaching the strategic nuclear forces, the SSBNs may be the only force remaining, and the ships at sea may be a principal link to that force.

To summarize, I believe that, over the next several years, the technical capability of our new SSBN systems in the form of TRIDENT D-5, in conjunction with the growing recognition of how the maritime strategy complements the SSBN force, will generate a major transformation in the assumptions regarding strategic nuclear forces. The old assumptions will be

replaced with what turns out to be the antithesis of a mind set that has dominated strategic nuclear thinking for three decades. I would also offer that continued Soviet technical improvement and the ability to simultaneously threaten current ICBMs and bombers, coupled with our own fiscal constraints make it difficult to cope with that development. We may find that an increasing burden of deterrence **has to be** transferred to the SSBN force. Likewise, arms reductions coupled with strategic defenses and fiscal constraints could raise broad interest, not only in making the fewer strategic nuclear assets remaining after an agreement more survivable, but in exploring how these assets could be used differently. Perhaps as contributors not only to strategic offenses but to strategic defenses as well. In other words, it is a fact that these issues will coincide over the next several years and could result in the nation asking our SSBN force to do more of the things than it has done in the past, and to do the things we have done differently.

As we decrease in arms control negotiations the number of strategic offensive missiles on both sides, it is important to consider which factors destabilize most those remaining few weapons. The factor that seems to be at the top of that list is **lack of survivability.** If we eventually reach a START I and a START II, or even a START III treaty we will wind up with total numbers of strategic missiles significantly less than we will have after START I. When we have only a few weapons remaining it is important that they be survivable. The situation becomes extremely unstable and our deterrent equation breaks down when one side can effectively target a large percentage of those weapons. It becomes more of a likelihood that a Soviet leader under stress could conceive of a first strike against those weapons. So survivability becomes an increasingly important element of our strategic offensive forces. For these reasons, the survivability of the TRIDENT submarine force is a national family jewel. The way we operate our submarines, the way we administer them and the way we assess their operational survivability are important elements of our deterrence, have paid strong dividends in the past, and will pay stronger dividends in the future.

In closing I would like to offer what I think are the 21st

Century imperatives for strategic offensive forces. They are: **survivability, operational flexibility, targeting flexibility, cost effectiveness,** and **room for growth.** We have not developed detailed projections of how these phenomena will interact over the next decade, but in thinking about it for the better part of the year, the Strategic Think Tank came to the conclusion that these 21st Century imperatives are the basics for thinking about nuclear forces for the next century. I'm convinced that the SSBN force will be recognized as best capable of meeting these standards. It will be increasingly seen as the force that ties the nation's nuclear policies and strategies together. In short it is the true keystone of deterrence.

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REUNIONS

USS BENJAMIN FRANKLIN (SSBN 640) will hold its 25th Commissioning Anniversary in Charleston, South Carolina, on 9 and 10 November 1990. All previous crew members and interested parties please contact:

Master Chief Harry Black
Building 646A, Naval Station,
Charleston, SC 29408
(803) 743-0081

USS LEWIS AND CLARK (SSBN 644) - 25th Anniversary 7 December 1990, Charleston, SC. Please contact:

Commanding Officer
USS LEWIS AND CLARK (SSBN 644) (GOLD)
Building 646A, Naval Station
Charleston, CS 29408

USS TRITON (SSR(N) 586) - All crewmembers are notified of a reunion to be held August 2, 3 and 4, 1991, at the Groton Motor Inn, Groton, CT. Please contact

TRITON Reunion
P.O. Box 991
Groton, CT 06340

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SSN ROLES AND NEEDS IN THE NEXT DECADE

by RADM H. W. Habermeyer, USN

The topic of SSN roles and needs for the future has stimulated a lot of discussion in the past, but with the dramatic shift of world events within the last year, this subject has drawn even more attention. Of interest, the current discussion of roles and needs for attack submarines often gravitates immediately to potential tactical employments without examining the strategic underpinnings which dictate the basis for submarines as an element of a nation's seapower. I intend to develop in this short presentation a framework against which SSN roles and requirements should be considered.

The emergence of the euphemisms Low Intensity Conflict (LIC) or Contingency and Limited Objective Warfare (CALOW) supports a presumption that Global Warfare is no longer a viable course of action among nations and that LIC or CALOW define the most likely scenarios in which seapower will be exercised in the future. We tend to leap to this conclusion because our experience of the last 45 years, during which the world has been dominated by the two superpowers, substantiates this projection of conflict. What we often overlook, however, is the fact that during this period our command of the sea has never been seriously challenged and the conflicts in which we have been involved have not required the United States to engage a major naval power at sea. With the disintegration of the Warsaw Pact and the turmoil in the Soviet Union there are those who now dismiss the Soviet Navy as a threat to our supremacy at sea and, seeing no other maritime power equal to the United States, call for a systematic dismantling of our naval forces. This reduction of naval power to match limited conflict scenarios is deemed to be the appropriate measure of maritime superiority by those who favor a limitation of naval forces. These same advocates of a smaller Navy argue that we should ignore the unchanged capabilities of the Soviet submarine fleet and turn our attention to justifying a Navy force structure based on Third World capabilities -- a path which could invite a major conflict at sea between the U.S. and belligerents.

A contrary thesis and one which history and Mahan's writings support is that seapower has its genesis as a national characteristic in peaceful and extensive commerce. Turbulence in commercial activities, changing trade relationships between nations and uncertainty in the world marketplace stimulate the factors which call for naval power. The free passage of commerce on the world's seas, the existence of stable trade relationships and reduced competition for new markets have the opposite effect -- diminished interest in the maintenance of a large fleet and a desire to limit naval power of competing states to a level which will assure continued stability.

If we examine the world's situation today, what we see are conditions of economic turbulence, shifting trade relationships between traditional trading partners, the emergence of new socio-economic spheres, ethnic unrest which portends new national boundaries and intense competition for new markets. In Mahan's view, the uncertainty for a continuation of peaceful and uninterrupted commerce should compel a maritime power to reassess its ability to guarantee free economic access to the world's markets. The United States as the world's foremost naval power must specifically concern itself with global economic stability during the period when these new market alignments are being formed.

Just how does the attack submarine's role fit into this backdrop of changing world events and what is its place in the maintenance of maritime superiority?

First, maintenance of maritime superiority dictates undersea superiority as a necessary adjunct. Furthermore, undersea superiority is more than simply countering an enemy's undersea threat. It requires a capability for our submarines to operate covertly and to penetrate maritime defenses anywhere in the world should hostilities dictate. The implicit offensive character of a submarine to operate anywhere is an important element of deterrence which will become more important in the future.

The deterrent nature of a submarine stems from the submarine's inherent covertness. An adversary knows that a modern nuclear submarine can dictate the time and place of attack; that the submarine has the ability to fix an opponent's defensive posture in reaction to an attack and, finally, the

submarine imposes on a potential enemy the requirement to invest substantial resources in antisubmarine warfare if he is to provide any countervailing force. One anti-attack submarine strategy, commonly referred to as bastion strategy, is testimony to the extensive character and reactive nature of defenses against a modern nuclear attack submarine. Since very few nations have the resources or technology to defend against the nuclear attack submarine, many would choose the course of action adopted by the Argentine Navy when confronted by a nuclear attack submarine force during the Falklands conflict -- withdrawal from the battlefield. For those adversaries choosing to confront a nuclear attack submarine force with a bastion-like strategy, the vulnerability of a fixed defensive system, or undersea Maginot Line, if you will, must remain a nagging concern. Just as the Germans neutralized the effectiveness of the French Maginot Line in 1940, a fixed defense is susceptible to being bypassed or to units delivering attacks along unexpected axes. These concerns in the mind of an enemy are the elements of deterrence that a nuclear attack submarine produces when war at sea or war from the sea is contemplated.

The offensive capability of a submarine which translates to deterrence can be applied in a number of ways by an attack submarine. In the traditional manner, submarines may be employed covertly against a nation's seaborne commerce, regulating the flow of resources if a covert imposition of a blockade is required. Or a submarine can be employed against the naval forces of a nation, interdicting their activities before they can be applied against U.S. naval forces. Submarines may be employed in a non-conventional sense in a variety of ways including introduction of special warfare forces, implanting of mines, collection of military or economic intelligence and covert removal of personnel from high risk areas. Finally, use of submarines to project power ashore with submarine launched cruise missiles can give the on-scene operational commander the ability to destroy or suppress key military or economic targets early in a conflict without exposing manned aircraft or other less covert power projection forces.

In the next ten years, the challenge of the U.S. submarine force will be to capitalize on the qualities which compel an

adversary to react to a submarine's presence in conflict and those capabilities which permit the submarine to deliver unalerted attacks. We are currently developing the vehicle to penetrate maritime defenses in the SSN-21. This combination of stealth, sensors, and firepower will prove to be a serious deterrent to future conflict; however, the SSN-21 is well-suited for winning at sea or projecting power ashore in the event that deterrence should fail. It is essential that we as a nation maintain this commitment to the SSN-21. This ship represents not only an investment in technology but an investment in maritime superiority which America must not relinquish. And this investment in maritime superiority is more than just an insurance policy; it is a statement that the United States will not retire from the world scene and rest comfortably in a 21st century form of isolationism.

By the turn of the century, our attack submarine force level is projected to decline. The numerical reduction represents a level of risk incurred by this nation, as we see no indication that Soviet submarine capabilities are being reduced to match the stated intentions of a restructured society. Worse, the pace of change in that society is introducing an instability which is difficult to assess. Unless we offset this risk by introducing a more capable submarine, we will relinquish by inaction a position of undersea superiority which has been achieved by more than a half century of commitment and determination, not by accident. We emerged from World War II with superb ships, highly-refined tactics and well-trained and battle-tested crews. We have built on that heritage for the last 45 years evolving the design of the submarine from the fleet boat to the SSN-21 and stressing the lessons of training and readiness -- proven in World War II and equally applicable today. This has been a success story of the first magnitude.

We need to continue to pursue that proven strategy of success. The first step, and a crucial one in the next ten years, is bringing the SSN-21 to the fleet and developing the tactics to take advantage of the tremendous capabilities which we are incorporating in the ship. Our focus on this critical issue should be sharp. I am not talking today about new submarine designs -- we will not produce another new design submarine in the next ten years. I am not talking about exotic new

weapon systems -- the weapon systems for the next ten-year period are either in the fleet or already under development. I am not talking about exotic new missions -- the SSN-21 has the capacity to undertake any mission projected for nuclear attack submarines for the next ten years. **I am talking about a very well-defined objective -- bringing the SSN-21 to the fleet and training submariners to fight her.**

Let me close with an observation on missions for submarines in the next ten years. I said earlier that the SSN-21 had the capacity to undertake any new mission for attack submarines which we can anticipate within the next ten years. I am aware, as are many of you, that there are new technologies with which our submarines will have to contend in the next decade. We are certainly not ignoring these potential undersea applications of advanced technology which you will probably hear more of during this symposium. As many of you know, we maintain an aggressive R&D program to pursue the technologies to increase our striking power and to develop countermeasures to emerging detection systems. In close association and cooperation with DARPA and Navy laboratories, we are sponsoring a range of new developments to enhance the multi-mission capability of the SSN-21. My statement which highlighted the SSN-21's versatility for new mission assignments is intended to provide not a barrier to adapting the SSN-21 to future roles but a springboard for expanded employment opportunities.

I said early in this presentation that I intended to provide a framework against which SSN roles and requirements should be considered. That framework is a familiar one, for it has been the legacy of almost a century of submarining:

- **Dictate the time and place of attack.**
- **Fix the adversary's defensive posture.**
- **Require massive expenditure of resources to counter.**

How do we achieve these goals? By maintaining the offensive character of a submarine to operate in any level of conflict within enemy-controlled waters. Stealth, Mobility, Firepower, Endurance and Sustainability -- the sine qua non of submarine warfare. ■

THIRD WORLD SUBMARINE DEVELOPMENTS

by John R. Benedict, Jr. (JHU/APL)

Proliferation of Modern Submarines

Significant military technology is being transferred to developing countries of Africa, Asia, Latin America and Oceania -- countries often referred to as the "Third World". During the five year period 1983-1987, nearly $190 billion dollars in military arms were transferred to Third World clients by various suppliers. The most recent trend in Third World arms delivered by U.S., Soviet and major Western European suppliers has been down due to the cessation of the Iran-Iraq war in mid-1988 and various debt problems for developing countries. The value of these arms (in constant 1989 dollars) decreased by about 20% during 1986-1989 compared to a similar period from 1982-1985. The number of weapons delivered during these same two periods decreased by a corresponding 30-60% for most major weapon categories (tanks, other armored vehicles, naval surface combatants, combat aircraft, surface to air missiles, etc.), reflecting the increasing unit cost of military hardware. Submarines were the only major weapon category that defied the overall trend. The number of submarines delivered to the Third World actually went up by 30%. This is consistent with other trends such as the more than 20% increase in the combined Third World submarine order-of-battle that occurred from January 1980 to January 1990. Today, twenty Third World countries have approximately 200 submarines, about half the total of more than 400 non-U.S./USSR submarines worldwide.

Nearly 45 Western supplied diesel submarines of relatively modern vintage (less than 20 years old) are operational in Third World navies today. More than half of these were supplied by West Germany to seven South American countries, Indonesia and India. The vast majority are variants of the popular TYPE 209 series produced by the HDW/IKL/FS consortium that offers "cradle to grave" service to their customers. In addition to building the submarines, the Germans also provide support in maintaining, operating and modernizing them. They also will teach Third World clients to

build the TYPE 209 for themselves. India has launched its first indigenously produced TYPE 209-1500. Argentina and Brazil are learning indigenous production from the Germans as well. South Korea and Taiwan are also expected to produce TYPE 209s during the 1990s. South Africa and Israel may have similar ambitions for an indigenous submarine production capability.

Orders for more than twenty additional TYPE 209s have been placed or are being negotiated with countries such as South Korea, Taiwan, Israel, Brazil and India. Other potential Western suppliers include the United Kingdom (OBERON submarines previously to Brazil and Chile, currently to Egypt), France (AGOSTA/DAPHNE submarines previously to Pakistan and South Africa), the Netherlands (ZWAARDVIS derivative previously to Taiwan) and Sweden (no Third World sales yet). Other potential clients who have expressed an interest in submarines for their navies include Malaysia, Thailand, Iran, Iraq, Saudi Arabia, and Nigeria. Saudi Arabia is currently negotiating for training submarines with several Western suppliers. Iran had previously ordered six 209s during the 1970s under the reign of the Shah. Fortunately, the order was cancelled after the Shah was dethroned. Otherwise, the 1987-1988 reflagged tanker escort operations in the Persian Gulf would have taken on a whole new dimension. If Iran and Saudi Arabia do acquire submarines, Iraq may eventually follow suit despite its very limited coastline (*prior to its invasion of Kuwait*). Submarines could provide an effective counter against a naval blockade being enforced by surface combatants.

Approximately 150 diesel submarines of non-Western origin can be found in various Third World navies. The Peoples Republic of China (PRC) alone has about 90 of these submarines, but less than half of them are considered operational. The vast majority of these submarines are ROMEOs produced by the PRC based on Soviet circa 1960 designs. China has since provided ROMEOs to Egypt and North Korea. North Korea has about two dozen diesel submarines, half of which are ROMEOs produced indigenously based on PRC designs. It is likely that North Korean ROMEOs produced in the late 1980s represent a significant performance

improvement over their Soviet counterparts from the 1950s. However, the most impressive non-Western supplied submarine in the Third World is the Soviet KILO that Algeria and India have received and that reflects the latest in Soviet conventional submarine design. It is unclear whether Cuba, Libya and Syria will eventually procure KILOs to replace/augment their FOXTROT and ROMEO submarines. It is equally uncertain what Third World clients the Soviets will support in the future. Arms exports have been a major source of hard-currency earnings for the Soviets in the past. If this remains the case for submarines, then Soviet exports will likely continue.

By way of summary, the number of modern Western origin submarines in the Third World will likely increase, perhaps as much as doubling in the next 10-15 years. The number of non-Western origin submarines may significantly decrease if Soviet exports are curtailed and if the PRC is unable to maintain its large order-of-battle. Regardless of the overall worldwide numbers, the quality of the submarines (latest TYPE 209, ROMEO and KILO designs) will continue to improve.

Submarine Propulsion Developments

Air Independent Propulsion (AIP) technologies are being investigated that will significantly increase the submerged endurance capabilities for diesel submarines. These technologies are intended to provide secondary power sources (200-600 KW) for recharging the submarine batteries. For low speed operations (4-6 KTS), the batteries could remain "topped off" as long as the stored oxidants or reactants last, i.e., potentially for 2-4 weeks or more. This reduces or eliminates the need for frequent snorkeling operations to recharge ship batteries and thus decreases submarine vulnerability to ASW prosecution. While operating at slow patrol speeds, the diesel submarine would only have to go to the surface for tactical events (e.g., periscope checks) and oxygen regeneration to maintain a proper atmosphere in the submarine.

Four AIP technologies are being actively pursued by Western manufacturers: closed cycle diesel engines, Stirling engines, fuel cells and low power nuclear reactors. Closed cycle diesel engines typically combine stored oxygen (either as

a gas or in liquid oxygen form), a working gas, recycled exhaust, and fuel at the engine intake. Excess exhaust products are usually either compressed and stored onboard or discharged overboard. The Italian firm Maritalia relies on a gas storage toroidal hull to store oxygen gas (at 5000 psi) and exhaust from the closed cycle diesel system on its midget submarines or mini-subs, thus allowing more than a week of submerged endurance for a 150-ton submarine. The Dutch company RDM, in conjunction with the British firm Cosworth Engineering, is developing a closed cycle diesel system called "Spectre" that relies on liquid oxygen and a patented exhaust scrubber/water management/overboard discharge system. This system is purportedly efficient even at depths of 300 meters.

The Swedish Navy has successfully demonstrated the Stirling engine AIP technology on a modified NACKEN-class submarine. This system relies on liquid oxygen and a reciprocating external combustion engine. It features a continuous burning process in an external combustion chamber that is kept in overpressure to facilitate overboard discharge of exhaust down to 300 meters. The German Navy, on the other hand, has successfully tested an alkaline fuel cell system on a modified TYPE 205 submarine. This system combines liquid oxygen and hydrogen (stored as a metal hydride) in a fuel cell to create a continuous chemical reaction that directly produces electricity without any combustion or heat transfer. As a result, the system is very efficient and potentially very quiet due to the lack of combustion and moving parts. Up to one month of submerged endurance should be possible.

The Canadian group ECS is developing an AIP System that relies on low power nuclear reactors, i.e., a "nuclear battery charger". A similar system has been licensed for unattended operation at research facilities ashore. The maritime version of this system is referred to as AMPS for autonomous marine power source. Although no military sales have occurred, it is scheduled to be installed on the French SAGA-I commercial ocean submersible by about 1995. Unlike the other AIP systems described, a nuclear battery charger could operate indefinitely -- not being constrained by stored oxidants or reactants.

A number of Third World countries have shown interest in

obtaining high power nuclear propulsion systems for their submarines. India, Brazil and Argentina have indigenous SSN development programs although Argentina's effort has been on hold since 1988. It is unlikely that any SSNs will be indigenously produced in the Third World prior to 2010 (except in the PRC). However, some shortcuts are available to these countries. Several countries including Pakistan have shown an interest in the French RUBIS submarine (or its quieted variant AMETHYSTE), the world's smallest nuclear attack submarine. India has leased the CHARLIE SSGN from the Soviets. It is unclear what constraints will be imposed in the future on SSN sales or leasing arrangements by the USSR, France, U.K. or PRC.

Threat to Western Power Projection Forces and Shipping

Submarines in Third World navies can be used for various warfare tasks including special warfare, mine warfare, anti-surface warfare and anti-submarine warfare. Swimmer delivery vehicles carry swimmers, mines or lightweight torpedoes on a skeg arrangement. Mini-submarines are often designed to carry mines or launch torpedoes from conventional torpedo tubes. Two to four heavyweight (HW) torpedo tubes can be installed on minisubs of 150-300 tons submerged displacement. Anti-ship cruise missiles such as EXOCET or HARPOON could also be fired from these HW torpedo tubes. Mini-subs can also be used to transport and deploy swimmer/mine/commando delivery vehicles from a specially designed lock-in lock-out chamber. Larger diesel submarines (over 1000 tons displacement) typically have 4-8 HW torpedo tubes and 14-18 torpedoes or missiles.

Heavyweight torpedo suppliers include West Germany (SUT/SST-4), U.K. (TIGERFISH), France (F-17P), U.S. (NT37E), Sweden(TP617), Italy(A184) and USSR(TYPE 53). Several of the Western supplied torpedoes are dual purpose and feature wire guidance, advanced active/passive acoustic homing, quiet electric propulsion and 250 kg warheads. The U.S. has provided submerged launch HARPOON to Israel and Pakistan; Egypt is due to receive this system in 1993. Other countries such as France with the SM39 variant of EXOCET are likely to pursue similar sales in the future. Both missiles and torpedoes have demonstrated lethality against surface

combatants. EXOCET missiles have sunk (HMS SHEFFIELD) or achieved mission kill (USS STARK) on various surface ships. A small contact mine (100-125 kg warhead) nearly cut the USS SAMUEL B. ROBERTS in half, and two British MK 8 heavyweight torpedoes (340 kg warheads) sunk the over 13,000 ton Argentine cruiser BELGRANO. The latter attack resulted in greater loss of life than the British suffered during the entire Falklands campaign.

The possible targets for Third World submarines range from merchant shipping to various naval combatants. Unescorted merchants or logistics supply ships transiting in confined sea regions would be relatively easy prey. Surface combatants operating in open seas would be more difficult. Submarines would generally be least susceptible to attack due to their inherent stealth and the lack of acoustic intelligence(ACINT) data likely to be available to most Third World adversaries. Thus, anti-submarine(ASW) operations against Third World submarines would often focus on the protection of surface forces, both shipping and combatants. U.S. attack submarines could make significant contributions to these ASW missions, but not if they are employed as the British did with their submarines in the Falklands.

The 1982 Falklands conflict is the best example of Western ASW operations against modern Third World submarines. The Argentines employed one modern submarine, a TYPE 209 diesel submarine named the SAN LUIS. It was operated by an inexperienced, newly assembled crew and equipped with Western supplied heavyweight torpedoes (SST-4 ASUW, MK 37 MOD 3 ASW). The SAN LUIS was on patrol for 6-7 weeks approximately 800 nautical miles from its base. It conducted two attacks against British warships. Both attacks failed reportedly due to fire control computer casualties and torpedo wire breakage, thus reflecting a lack of operational readiness, i.e., inadequate maintenance and unrealistic training. The British were very fortunate not to have lost a warship to torpedo attack, particularly since they failed to achieve a coherent ASW picture in the operating area. More than 200 items of ASW ordnance were expended, mostly against a sea full of false contacts and not the SAN LUIS. Numerous ASW assets were involved including two ASW aircraft carriers and

more than a dozen frigates and destroyers plus associated ASW aircraft. Several British submarines were also deployed to the Falklands region but could not be integrated into the coordinated ASW operation. In fact, these submarines were geographically separated to eliminate any possibility of fratricide and to allow "ASW weapons free" for the main task force.

In the Falklands campaign several controlling factors were apparent that tend to make ASW difficult against Third World adversaries. First, diesel submarines are inherently quiet when operating on batteries and represent difficult detection opportunities for passive sonars. Second, adverse (often unfamiliar) acoustic environments are all too common in Third World operational settings. Third, less operational and technical intelligence data may be available on the adversary than for the Soviets, particularly if the adversarial relationship is unexpected. Fourth, it is often a rapidly developing "come as you are" conflict and potentially involves long supply lines. Fifth, early catastrophic losses (e.g., sinking of the BELGRANO) can be an effective deterrent to the forces affected and potentially will undermine the popular support for the conflict. Not demonstrated in the Falklands, but important factors in other Third World contingencies nevertheless, are restrictive rules of engagement and concern for collateral damage. Near positive identification (whose submarine is that?) and unambiguous adversary intentions may be required. Without clear ID and establishment of intentions, target destruction may not be allowed and other measures will need to be taken to neutralize Third World submarines.

Third World ASW Requirements and Associated SSN Program Areas

Four examples of Third World ASW related requirements will now be given. First, it is apparent that there is a need for high SSN survivability (i.e., low risk of combat damage) while involved in Third World contingencies and limited conflicts. Future SSNs require appropriate self-defenses to counter a diverse variety of Western and non-Western produced ASW torpedoes and mines. Countermeasures development must be adequately supported by an intelligence data base on a more diffused threat than previously has been evident for NATO/-Warsaw Pact scenarios. The general requirements for quiet

torpedoes (launch/running) to reduce counterattack potential and for low submarine signatures are clearly reinforced in Third World scenarios. Operations in shallow/confined seas, possibly tracking diesel submarines, magnify the importance of signature control in order to accomplish ASW missions with prudent risk.

Second, it is evident that there is a requirement to be able to track and possibly neutralize non-nuclear submarines (swimmer delivery vehicles, mini-subs, diesel-electric submarines, etc.). This implies that adequate cueing mechanisms must be in place to support SSN tracking operations against very low radiated noise signature targets, i.e., diesels operating on battery. This has implications for both C^3 to exploit external cues and for innovative self-cueing mechanisms for SSNs. Both types of cueing may be required to keep track of diesel submarines and to determine if they pose a potential threat to power projection forces or other assets in the region.

To sustain SSN tracking operations against quiet diesel submarines will require a combination of SSN sensing mechanisms. "Full spectrum" passive acoustics may be a significant player but only if various noise sources characteristic of confined sea regions can be properly processed with the help of an adequate acoustic intelligence (ACINT) data base. Currently, ACINT on non-Soviet diesels is limited compared to that collected on Soviet nuclear submarines. Active sonar or non-acoustic sensing may also have significant roles in allowing U.S. SSNs to track Third World diesel submarines.

"Neutralizing" a Third World submarine so that it does not pose an immediate threat to protected naval and mercantile units could be difficult under ROEs that prohibit destruction of the adversary submarine. An SSN assigned this task may have to resort to various methods of deception, harassment or disablement not previously anticipated against the Soviets.

A third requirement area relates to the need to develop a coherent tactical picture by the SSN, both to ensure efficient use of limited resources and to avoid collateral damage. Disabling or destroying a non-adversary submarine during an escalating crisis would have major repercussions. Questions such as what class of diesel submarine is that (ROMEO, KILO or TYPE 209) or whose ROMEO is that (Syria's or Egypt's)

will be very difficult to resolve. Efficient use of limited ASW resources will not be possible if a high percentage of assets are wasted on false contact prosecutions (e.g., as was the case in the Falklands). Sonar beam patterns, transmit pulses, signal processing techniques, and displays must be designed to cope with dense coastal shipping, high bottom interaction acoustics and other unfavorable conditions associated with Third World regions. Tactical decision aids (TDAs) that are capable of exploiting near real-time oceanographic support will also contribute to optimized use of SSNs and their sensors. Finally, effective acoustic training methods are needed that give sufficient emphasis to Third World diesel submarines or mini-subs (in addition to the focus on Soviet submarines).

A fourth requirement area relates to effective SSN coordination with other naval assets. Secure, reliable Low Probability of Intercept/Exploitation (LPI/LPE) communications are needed for SSNs to ensure timely reporting of adversary submarine movements, thus allowing protected units to take appropriate defensive actions. Communications are also needed to allow timely receipt of tactical information by the SSN, ranging from local surveillance data to a change in ROE by higher authority.

In some Third World contingencies a variety of U.S. and allied naval assets will be employed in a constrained operating area and/or in a confined sea region. In this case it is necessary to develop a coherent force tactical picture (that the SSN contributes to) that will allow effective SSN integration into coordinated ASW operations. Otherwise, the Falklands solution will likely occur, that is, geographic separation and a limited ASW role for SSNs. SSN integration into force operations must be preceded by realistic operational training in coordinated ASW by the various players (ships, aircraft, submarines, surveillance assets). This must include exercises against diesel submarines (e.g., made available by our Allies) in marginal sea regions.

Summary

Modern submarines and weapons will continue to proliferate in the Third World. Modern diesel submarines today are capable adversaries that pose a serious threat to power projection forces and other naval and mercantile units. In the

future these Third World submarines will become even more capable (quieter, greater submerged endurance, advanced weapons), their crews will become more proficient, and improved infrastructure support will exist for Third World submarine operations. Various factors complicate ASW operations in Third World regions, and the resulting ASW requirements are not simply a subset of Soviet-derived requirements. The combined requirement to enhance strategic deterrence (hold adversary SSBNs at risk, enhance security of our SSBNs during port egress/ingress) and to enhance conventional deterrence in Third World contingencies and regional conflicts (hold adversary attack submarines at risk, enhance security to various forces) has the following broad implication: Submarine ASW will continue to require advanced technology solutions.

The reduced likelihood of a NATO/Warsaw Pact conflict provides an opportunity to focus more on a neglected military planning area -- Limited Conflict. Do not mistakenly assume that less advanced technology is required to deal effectively with Third World (vice Soviet) adversaries. However, do not assume either that the same technology solutions apply to both cases.

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MILESTONE

The last U. S. Navy Diesel-Electric Attack Submarine, USS Blueback (SS-581), was decommissioned on October 1, 1990 at ceremonies at the Naval Submarine Base, San Diego.

A DETACHED VIEW OF THE SUBMARINE FORCE

by Dr. Norman Friedman

Thank you very much Admiral Long, and thank you for inviting me. The views that I'll give are my own. I have sometimes been associated with something governmental, but please don't think this is other than my own view. It is not a U.S. view or any industrial view that I know of.

I'd like to talk about what glasnost and perestroika mean for us. Don't bet that glasnost means they're all very nice. When we look at the Soviets we tend to look at their strengths; or at least we have until recently. So we think of them as very dedicated but with some major weaknesses.

Most of you have lived through revolutionary development in electronics. Computers went from not too reliable and very expensive to quite reliable and dirt cheap. That hasn't happened over there. When you look at the characteristics of a submarine or a surface ship or an airplane, one thing that you discover is that you're looking at the weapons and the sensors and the combat direction system but we don't normally see what those systems are like in the Soviet case. We see how many submarines there are, how many torpedo tubes, we watch them fire torpedoes. It's much more difficult to know how good they are internally.

What happens after glasnost? We all know the Soviets are now our friends and they're nice people and we want to fix their economy, right? How do we fix their economy? We give them all the goodies that make modern economies work in the West. That includes computers and computer chips. That's just the kind of stuff we're talking about freely exporting to these nice people in the East who clearly have our best interests in mind. On their past track record a lot of that isn't going to end up fixing their economy. The purpose of perestroika was not to make them a loving, caring society that was nice for other people. It was meant to make them better and tougher. The track record of the Russian and Soviet society is not exactly a warm one.

One of our problems in this country is that we've associated Soviet aggressiveness and unpleasantness with Communism. Unfortunately the pre-Communist state was not too much

better. A lot of people in this country are descended from those who left while there was a czar. He was not too nice either. Also, if you look closely at the political movements currently going on in that country, a lot of them are not what we would call humanistic and warmhearted.

Now let's imagine that the future isn't quite as stable as we'd like to think. When people talk about the Soviet's five year plan there's an assumption that the Soviet government roughly remains the same. I wouldn't be shocked if you saw some very nasty changes in that country.

If you go back in history to the French Revolution, you find that it started off in a fairly gentlemanly way but later it wasn't so nice. Now, if the Soviet Union should go through some kind of convulsion, which I think is a very likely proposition, (that's why I said before I'm not speaking for anybody else and I don't think the United States government would care to make that statement), then what comes out of it at the far end? Well, it might be a much more efficient country. Democracies turn out to be amazingly efficient compared to dictatorships, especially as dictatorships age. It's not likely to be a friendlier country.

So the Soviet Union probably is out of business for a while but then comes back; maybe more effectively, maybe not, certainly possessing large amounts of military power which don't vaporize if the country is stopped for a while.

Meanwhile in Europe you find a great deal of wishful thinking. After all they lived under a real threat as opposed to the abstract threat of nuclear weapons. So although we know the Soviets can vaporize us right now, we really think they would prefer doing something else with their time. On the other hand, if you are a Central European, it's a very real threat. There are all these tanks and they can come. Well, now the tanks are a lot further away. Therefore there will be a very strong view in Europe (there already is but it will get a whole lot stronger) that threats can be dispensed with.

What does that mean? Well, it means, "Good night, bases" in a lot of places, because we operate in the Third World not really at the behest of whoever owns the base we use. They give us basing generally in the hope that we will protect them from the Russians when the Russians come. If the Russians

aren't coming, (in their view, not mine) then why let us use the bases?

When we bombed Libya there was a tremendous outrage in England about using British airbases. But of course it's all right because basically we are their security against the Russians vaporizing their country. Well, if they think the Russians aren't going to do that any more, then "Good night to that."

Now that doesn't mean the world is any safer; and in particular, it doesn't mean that the Third World problems go away. In fact, they'll probably get worse. What that says is that we have to live with forces that can move around without other people's permission; completely without other people's permission. It also probably says that mobility becomes more important and that probably means nuclear power gets more important. I don't see any way around that. I think we'll probably lose bases, possibly all the bases we have now. We will go back to a world where the U.S. Navy takes with it what it needs. That's like the Navy before World War II. It really can be made to work, but it isn't cheap.

On the other hand, if we have no more bases in Europe, we can certainly eliminate other wastes of money (generally painted dark brown or light blue), and in that way we can completely square the budget circle. We're only about one-third now and if we were to increase to 80% of the defense budget then the total is no problem.

Let's talk about the Third World. First of all they're getting more money so they're buying better goodies. As the Western requirements go down, you have a lot of people out there who want to sell. They will sell, in some cases, to whomever comes with a basket full of money. In some cases there will be some restraint but not a whole lot. The main thing about the Third World is that it is completely unpredictable.

We go about the Third World and find people that we back and we sell them our goodies and should there be the unthinkable and they switch or decide they don't like us, we are always offended. Of course they do have the weapons at that point. Those weapons include lots of diesel submarines and they include lots of Western missiles. They will in the future probably include lots of ex-Soviet stuff. One of the unfor-

tunate zingers is that the ex-Soviet stuff will not be operated by Soviets.

If you look at patterns of Russian operations, there are ways in which they are not terribly efficient. They like collective operations; they tend to be stereotyped. We gain certain advantages from that. We've tended to downplay the advantages we get out of their geography and the advantages we get out of some stupid things they do. When their stuff gets sold in the Third World or used in the Third World, it doesn't suffer from those disadvantages. Also, it may be combined with Western electronics which are freely exported in the Third World. That's a very serious problem for us. It's a problem of perception. Another thing about the Third World is that many of the countries that we find the most obnoxious have been basically subsidized by the Soviets in the past. If indeed the Soviets are in an economic crisis, the subsidies have to be cut off. I would read most of what has happened as an attempt by Mr. Gorbachev to cut his expenses, because he just can't afford these things anymore. What happens when you are a thug and they're not paying your bills anymore? Do you become a nice boy? I don't think so. I think you start looking for better ways to rob your neighbors. That means you get nastier, not the other way around.

I was very disturbed to hear about interest in reducing troops in Korea. The North Koreans have not accepted perestroika, love for humanity or anything remotely like that. They are a very nasty bunch. Now if they are a very nasty bunch that is now a poorer nasty bunch, what are they supposed to do? One of the misfortunes of hearing diplomatic language is you always use lengthy words to hide the fact that you're talking about thugs. These are very nasty people. They are nasty people that we get involved with. There's no way out of that.

Now the other thing we talk about is the number of submarines that there are in the Third World. You'll notice that a lot of them aren't really enemy subs and people say there are only a few in each force. There's a big difference between operating in the Third World and operating with the Soviets. If we fight a big war with the Soviets, which I hope we won't do, then we take a lot of losses and they take a lot

of losses and hopefully we come out on top in the end. No one is particularly shocked at this because if you win against the Soviets, they don't come back next week. If you deal with someone in the Third World, actually the thing you get out of that one combat is not so direct.

Let's take Mr. Gadafi. He likes to finance terrorism. We drop some bombs on him. The purpose of bombing him is two-fold. One is to deliver a message to him that we can come back later and kill him. Not necessarily to do all that damage right now, but to show him we can do what we like with him.

Message number two, which is a whole lot more important, is to show everyone else who also dislikes us intensely that we'll come to them. Some said when we bombed Libya that Syria was really much nastier and we should have done it to them. What you should do is hit someone easy and tell the others that you'll get them and then they don't find out how good you are at it. What that says is that operations in the Third World should be like the swipe with the back of the hand. It has to be overwhelming, it has to be almost cost free. Not because we'll go crazy if they pick up a couple of pilots. I think that's overrated. But because we don't want the others to get the idea that they can exhaust us.

When I was a college student during the Vietnam War, there was a cry by the left that it will be one Vietnam, two Vietnams, many Vietnams. What they really meant was that we can't afford a lot of those things at one time. The reason there weren't many Vietnams is that it wasn't that nice in North Vietnam when we were bombing them. So it really didn't encourage others to think it was a good idea.

How does the submarine come into that? First of all, most of the way we bomb places is from aircraft carriers. The Air Force is attempting to get in on the game but I think they will fail. At any rate, carriers, large amphibs, or any large ship which is damaged by a sub in a Third World operation causes a severe political heartache. Why? Because it shows we couldn't do it with a swipe of the wrist. It shows that if a lot of them do it at once, we're in trouble. Therefore, it's very important to be able to neutralize those subs. Our own submarines, particularly if they have some means of long range

counter, are rather valuable for that job.

In a big war, if we have 15 carriers and we lose 3 or 4 carriers, that's life. We damage one carrier in a small operation like Libya, that's bad news. Number two problem in a big war: if you kill a couple of neutrals, life is cruel. In a little thing in the Third World, if you sink a sub and it's not the bad guy's, you've got real problems. People will scream. Submarines are frequently almost identical because they don't build them themselves. They're buying off the shelf from someone else. That's a serious issue, that IFF problem. I don't have clever comments about that. I'm telling you it's a different game than it is in the big war. In the big war we try to stop up the Russians at source. The geography helps us a lot. In a small one, we probably can't do it. They may come out to sea before we even show up on the scene. That's a problem. There's a problem of endurance.

Now the other thing in the Third World is that surveillance and other kinds of intelligence operations become terribly important. Covert submarines are the ideal means of doing that. Therefore, it pays to have types of submarines with a lot of capacity. If I were trying to sell SSN-21 right now, and I certainly support it strongly, I would emphasize that. You talk about fire power and that's nice if you're killing people. But those spaces could also be filled with other things for surveillance, for playing games with bi-static active sonars, all sorts of things. I was very distressed about the cancellation of Sea Lance because I think of that as a way of deterring other people's submarines from coming out to play. They may be terribly quiet when they're sitting there but when they run at speed to do something, you'll hear them. When they ping, you hear them. If a submarine commander opposing us knows that at the moment that he's cheerfully sitting there, we'll blow him away from a distance he can't even imagine, that tends to turn him off a bit and a lot of this is psychological.

You've honored a man before for going out, staying on the bridge and firing almost his whole load of torpedoes at night in a terrifying surface action. Everything in his effectiveness depended upon how much guts he had. Therefore, the first thing we should do in the Third World is to convince the average submarine skipper in those navies that living another

few months might be a good idea. That's very important. We are in a game of trying to terrorize those guys.

One of the scary things in the Falklands was that the Argentine submarine commander was not terrorized sufficiently. It's a very great pity that the British didn't do their thing because now he raises a standard for conduct in the Third World which could be extremely uncomfortable for us. That also goes for the world in which the main problem is not about worrying about the Soviets but all of these other people with very varied weapons, some of which we supply, some of which are made locally.

It's also a problem of our intelligence. We tended for years and years to become very good at collecting on the Soviets. We know a lot about the Soviets. As a writer, I wish we would talk more about them, but that's life. Information on the Third World tends not to be nearly as good and I say that both from trying to find literature in the open and from my knowledge of the closed literature. It tends not to be sophisticated enough. It's a very varied world; it's important to have that varied information.

As regards more automated systems, we try to identify what's coming in some automatic manner. It's terribly important that our automated systems be aware of the variety that is out there. Most of those weapons are not terribly amazing. I'm not telling you that there is some death ray out there made in Patagonia that will kill you. What I'm telling you is that if someone fires a Chinese made missile that has a seeker that is a little different from ours or Russia's or Britain's and our ESM device doesn't pick it up because it thinks it's something else and we get killed, we're still dead. That's unfortunate.

Let me make one last point. We are in a world where the numbers of subs are falling. They're falling in all navies. We also are in a world where most people pick up information on submarines by reading standard handbooks like Combat Fleets. It's very difficult reading those handbooks and that's what Congressmen, columnists and people like that read to make any sense of the submarine business. But in those books, nuclear subs all go 30+ knots and silencing information is meaningless. We don't know anything about combat systems in these books. How do you explain to people why one sub

is better than another, or worse? How do you evaluate submarine forces? The Soviets have some kind of methodology which I probably wouldn't trust. I've never seen good methodology anywhere, classified or otherwise.

As the Soviets cut up their klunkers we will inevitably hear about how these enormous sacrifices for peace are being made. I don't have a lot of respect for their military science but they're awfully good at PR. They have lots of friends here and they always come around crying poor. This defensive posture, which is incredible baloney, is being pushed extremely well. We have to be smart enough to put that down. We have to be able to do better than raw numbers because when we've relied on raw numbers in the past, now that the raw numbers are falling in favor of quality, we get hurt and that's dumb; we're not dumb people and we can do much better.

What's going to happen? First, what you are seeing now is some kind of transitional period and I think it's a lull before some very nasty storms. Most of the storms will not affect us personally because we don't live in places like Smolensk or Moscow. I cannot believe that Mr. Gorbachev will last a whole lot longer because he has completely failed to save the Soviet economy. By November there will probably be large scale famines.

People don't like that. They tend to do things about it. To me, the biggest surprise in the recent past was the total inability of Soviet security forces to stop people from shooting each other in the Soviet Union. I was appalled. We were all brought up to believe this was a tough dictatorship; that they're really good at it. If you whispered to someone next to you that you hated the government, they would shoot you tomorrow morning or at least lock you up. Then you see pictures of people in Asherbijian with hunting rifles shooting at Russian troops. They get killed later but they're for real. There's something very weird happening there. It's possible that the KGB is as inept as the rest of the government. They're no good at anything else; maybe they're not as good at terror as they thought they were either. But if that kind of thing is real, if really they're not that good at control, if the Party does resist, as it probably can't avoid resisting any kind of freeing up of the economy, we're talking about a large

number of people losing privileges that they're not going to be happy to lose. If you start seeing very severe shortages in major cities, it seems to me you have a recipe for some very unpleasant developments. In Mr. Yeltsin, and probably others we don't even know about, you have people quite prepared to take advantage of that so that you'll probably see horrendous convulsions involving large numbers of dead people.

In Eastern Europe right now you have the euphoria of throwing off foreign control in favor of locals but they haven't solved their problems either and they're all broke. We talk about how the market will solve their problems but you have to remember, when you go to a market economy like ours, the mechanism that makes people work basically is two fold. One is a carrot that we're all happy about. Work hard, get rich, and everything's great. The other is a stick; don't work, you starve. Now the poorer the society, the rougher the stick gets. Those are very poor places. And I find it hard to imagine again that within a few years as the stick hits harder, that there aren't gross instabilities there also. Former Party members remembering the good old days. People deciding that if you merely seize their property, that they after all stole from the population, life will be better, right? You really think all those places are going to remain under the rule of law that, in some cases, they never remember anyway. These are some nasty places.

As far as Germany goes, I would point out that under their current deal with East Germany, they practically bought themselves gross inflation and unemployment. Apparently the one lie about East Germany was that people thought it was the one Communist country where people worked and we discovered that's not true. I would not bet that that's a very happy proposition either.

Now a navy is different from an army or air force. Armies and air forces are put in particular places to do particular jobs. As long as the world of defense is dominated by army types or civilians whom you don't realize are army types, they always think of buying systems for specific jobs. We are the only part of the world which is general purpose, truly general purpose. You know you get into a sub and someone says go to the Pacific, and you go to the Pacific. Go to the Atlantic, you go

to the Atlantic. Fight the Russians, you fight the Russians. Fight Gadafi, you fight Gadafi. Same people, same Navy. One thing we have to resist are cries for specialization.

Nimitz wrote an article in 1946 called Your Navy as Peace Insurance. You don't buy life insurance because someone is going to pump you full of lead tomorrow morning. It's cheap insurance. I think that's a point that's well worth making. As we get kicked out of places around the world because they think the threat is gone, we are what's left. The ability of the United States to go where it wants -- that's so valuable.

I'll leave you with this one comment. We are fond of saying that the world was too unsafe until now. Baloney. The world was incredibly safe until now because there were rules. If the Russians grabbed Berlin, we incinerate the Russians. If we grabbed Hungary, they incinerate the U.S. Simple, straightforward rules. Now there aren't any more rules. People are beginning to find that out. Where do you think all the nastiness of the last half century originated?

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SUBMARINE PHOTOGRAPHS

The Royal Navy Submarine Museum has a very large collection of submarine photographs (predominantly British but many international) from the earliest days. Copies are available for sale: price depends on size plus postage.

For further details, contact Graham Dobbin, Deputy Director, Royal Navy Submarine Museum, Haslar Jetty Road, Gosport, Hampshire PO12 2AS UK.
Tel: Gosport (0705) 510354. Fax: (0705) 511349.

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THE SUBMARINE THREAT OF THE FUTURE

by William H. J. Manthorpe, Jr.

Introduction

As you think about the roles and missions of the U.S. submarine force in the future it is comforting for me to see you still paying attention to the threat. Those who claim the threat is gone fail to differentiate between intentions and capabilities and between current and future threats.

There is no doubt that, because of the internal political and economic problems faced by the Soviet Union today, the Soviet political leadership does not have the current intention of threatening the U.S. or the western world. Also, because of the economic problems and the turmoil in Eastern Europe, the Soviet political leadership is reducing it's current capabilities for conducting ground offensive warfare in Europe.

Furthermore, it does not look like those internal political and economic problems will be solved soon. But the goal of perestroika is to solve them. If and when that happens, what will be the intentions of the Soviet leadership of the future? Can we depend on those intentions being benign? The answer, of course, is: "No, I would not bet my country's security on it."

The job of military strategists, planners and weapons developers, and all of us who support them, is to think, "What if **intentions** change?", and, then, prepare for that eventuality, by developing capabilities to match and counter the capabilities of the other side. That is an unpopular position to take today when "Peace has broken out". But, as submariners you know that a submarine force cannot be built in a day, or a year. We can't wait until we know that intentions have changed to prepare. The submarine force must be ready, in terms of capabilities, to thwart any intentions of the other side by matching and countering its capabilities.

The Soviets certainly understand that: Chief of the General Staff General Moiseyev said in February; *Some ... raise the question of whether ... it is sensible to build heavy aircraft-carrying cruisers, large nuclear submarines and other military equipment. To me the answer is clear. The miser pays twice. Here, as in the development of space, you cannot lag behind.*

You cannot catch up later.

Admiral Chernavin, CINC of the Soviet Navy, noted in a recent article, *it is difficult to mass produce nuclear submarines during a war.* Thus, despite all the guidance from their political leaders to undertake unilateral force cuts, arms control agreements and defensive doctrine, Soviet military men are also thinking "What if?"

What I'd like to describe for you here, is not current intentions of the Soviet politicians, which we all recognize and welcome as being more limited than in the past. Nor do I want to focus on current Soviet military capabilities which are being seriously constrained by political guidance and economic drawdowns. What I want to highlight for you is what the Soviet Navy is thinking and doing to prepare their submarine force for the "What if?" of the future.

I'm not going to do that based on wishful thinking or mirror-imaging. I'm not going to do it as an intelligence estimate either. I'm going to do it by giving you the Soviet Navy's own words and actions that illustrate how they would like their submarine force to be in the future. Of course, political restraints, economic problems and scientific and technological problems may preclude the Soviet submarine force from becoming all it would like to be. But, "What, if?"

Status

The Soviet Navy is a submarine Navy. Since the days of Admiral Gorshkov, submarines (along with land-based naval aviation) have been repeatedly characterized as the "main striking forces of the fleet." Indeed, the Soviet Navy asserts that; *all principal indicators characterizing a modern Navy are concentrated in nuclear-powered submarines: great striking force, high mobility and concealment and the capability of conducting combat operations on a global scale... .*

Admiral Chernavin, himself a submariner, has proudly pointed out that general purpose submarines constitute 30% of the Soviet Navy while the submarine force is only 21% of the U. S. Navy. Further, he has willingly acknowledged that, *The USSR does indeed have more submarines than the United States.* In fact, even in their various calculations of the naval balance intended to promote naval arms control, the Soviets have documented that they have more general purpose

submarines than the U.S. and NATO combined in the Atlantic region and more than the U.S. in the Pacific.

It should also be noted that, under SALT, the Soviet Navy was permitted and has retained 62 modern ballistic missile submarines and even some older diesel ballistic missile submarines. That is, also, a much higher total than the U. S. Navy.

This pride of place for the submarine force in the Soviet Navy will not change in the era of perestroika, defensive doctrine and reasonable sufficiency. In 1987, when the full impact of those new political-military factors was just beginning to become apparent to the Soviet military, Admiral Chernavin was asked to what he would give priority in these new circumstances. He responded; *as before, to nuclear submarine construction.* He expanded; *This includes ships with ballistic and cruise missiles of various ranges capable of hitting any target on land or sea. In the future, we have no intention of increasing the quantity of nuclear submarines but we do envision taking all the necessary measures to substantially enhance their tactical and technical characteristics and quality.* Indeed, as the true impact of "reasonable sufficiency" became even more apparent, the Deputy Commander in Chief of the Soviet Navy, Admiral Kapitanets, has admitted that there is even the *possibility of a certain quantitative reduction, while at the same time improving the qualitative characteristics of ships, their armament and technical facilities.* That is exactly what is happening in the Soviet submarine force today.

Reduction

The Soviet submarine force is, indeed, taking quantitative reductions. In the early stages of naval arms control, the Soviets offered to reduce their submarine force by 100 units in exchange for the reduction of five to seven U.S. aircraft carriers. Fortunately, despite the enthusiasm of some for such a deal, the U.S. recognized that blatant Soviet attempt to get something for nothing and did not buy it. Clearly, those were subs that the Soviets intended to scrap anyway. Old, obsolete, inactive ships that were of no utility. So, not finding any takers, in late 1988, the Soviets began towing or barging those subs to foreign scrapping yards. So far, almost 40 diesel submarines of 1950's vintage, mainly WHISKEY class units,

have been scrapped. Those submarines weren't operational before they were sent to the breakers yard!

Further, the Soviets have told us that after *analyzing the conditions of (their submarines) in the wake of the accident involving an ECHO II class submarine off Bear Island* a year ago, they have decided that *nuclear-powered submarines of the first generation will be taken out of service ahead of schedule.* Thus, in addition to uncounted numbers of old diesel submarines, the Soviets have at least 50 old nuclear powered submarines to scrap over the next several years. Clearly, they are reducing their submarine order of battle.

Order of Battle

In 1989 about one third of the SSN order of battle was comprised of the modern VICTOR III, AKULA, and SIERRA classes. That proportion of new nuclear submarines will increase significantly as the scrapping of diesels and old nucs continues.

Construction

But scrapping isn't all that has been going on in 1989 and 1990. Six submarine classes are currently in series production: VICTOR III, AKULA and SIERRA class SSNs, the OSCAR class SSGN, and KILO SS as well as DELTA IV SSBNs. There were nine submarines launched in 1989. That number equals or exceeds the number of subs launched any year since 1982. Included were a VICTOR III, AKULA and SIERRA SSN, the last TYPHOON and a DELTA IV plus four KILOS. In terms of tonnage launched, production was the greatest since 1986. This same high level construction rate is expected to continue into 1990, indicating that perestroika has not yet affected submarine production. This, the overall number of these new classes in the Order of Battle could double over the next ten years.

Modernization

The overall quality of this force will also be significantly improved over today. For example, the new SSNs are quieter than their predecessors. They can also carry the SS-N-21 land attack cruise missile. The OSCAR SSGN has a significant speed and noise advantage over the ECHO II that it replaces. Furthermore, it mounts three times as many cruise missile tubes (24 vs 8) and it carries the SS-N-9 missile, a great

improvement over the SS-N-3 or SS-N-12. The DELTA IV with its SS-N-23 gives the Soviets their first SSBN/SLBM combination with a potential hard target kill capability. Where do they go from here?

Fourth Generation Submarine

The MIKE or KOMSOMOLETS disaster has highlighted for us the status of development of the Soviet Navy's next generation of nuclear submarine. The KOMSOMOLETS by all accounts, was an "experimental" submarine on which "twelve very important scientific-technical problems were being resolved." Clearly, the KOMSOMOLETS was not a prototype of the next generation submarine. According to Admiral Chernavin, it had been designed in the 1960s. However, it was not launched until 1983 and thus, had likely been completed as a test bed for materials, techniques and systems being considered for incorporation into the next generation submarine.

According to Admiral Chernavin *one special feature was a reinforced titanium hull enabling it to dive to 1000 meters.* Associated with this deep-diving capability was the explosive deballasting system which played a role in the exacerbating the problems of an already endangered ship. It was also described as a highly automated submarine and had a small and mostly officer and warrant crew. That, of course, was another drawback when it came to fire fighting and damage control. The disaster also highlighted for the Soviets a myriad of submarine design problems: with their electrical distribution systems, their oxygen and high pressure air systems, compartmentation and water-tight fittings as well as the presence of combustible materials and numerous deficiencies in firefighting and damage control equipment and procedures. Is it any wonder that, one year after the KOMSOMOLETS disaster, the Soviet Minister of Shipbuilding Industry said, *We are now revising a great deal in submarine design.*

Those design revisions and current Soviet economic problems are likely to delay the construction and launch of the Soviet Navy's next generation submarine. While, given the timing of the past three generations, the next generation might have been expected in the early 1990s; given the design and economic uncertainty today it could now be delayed until near

the turn of the century.

Clearly, then, its specific characteristics cannot be identified in any detail. But we do have some idea of what Soviet Navy design goals are and what they think they can achieve. The navy laid out the "Prospects for the Development of Submarines" in a 1988 book on, The Navy: Its Role, Employment and Prospects for Development.

Overall, the Soviet Navy expects that *the future development of submarines will follow the path of an increase in depth and speed, a decrease in the amount of noise and wake, and an improvement in power plants.* More specifically, The Navy claims; *in the near future ... submarines will reach diving depths of 2000 meters and more.* Achieving such depths for submarines, they believe, *reduces the possibility of their being detected.* And, *the probability of a submarine being destroyed by an ASW weapon decreases* while *their own capability to search for an enemy increases.* In all, *an increase in the submergence depth of a submarine gives it important tactical advantages.* Also The Navy announces; *it is planned to achieve speeds of 50-60 knots.* And, in conjunction with that, *the main way of increasing power plant effectiveness will be to increase their power by reducing their specific weight.*

Thus, as the Soviet Navy makes some progress toward its design goals, despite technological and economic restrictions, the next generation of submarine will be deeper diving and faster than the current generation: At least the next submarine should achieve the 1000 meters designed into the KOMSOMOLETS and, perhaps, approach 50 knots in burst speed.

Also, worth noting are some omissions in Soviet Navy design goals. There is nothing about quieting. Although they obviously hope to get quieter, the Soviets don't seem to expect any breakthroughs. There is nothing about exotic power plants. Rather, they imply efficiencies through improvements to current power plants. Finally, there is nothing about titanium hulls, despite the KOMSOMOLETS being a titanium hulled submarine. Thus, it is not clear that the Soviet Navy has yet committed itself to only titanium hulled submarines for its next generation.

In terms of weapons for that next generation submarine,

The Navy calls for *the further development of ASW missiles ... increasing firing range to more than 50 km and (thus increasing) the probability of destruction of enemy submarines.* Further, *torpedo speeds must increase with respect to current ones by a factor or 4 to 5 and reach 200-300 knots.*

Clearly, the Soviet Navy has design goals for and has been planning a fourth generation nuclear submarine with, at least, significant depth, speed, and weapons advances over the current generation. Now, faced with the challenges of redesign and with economic constraints, that generation may be later in coming and not as advanced as had once been hoped by the Soviet Navy. Yet, it will surely be an advanced and capable submarine of which a submarine Navy can be proud.

But, how will the Soviets use that submarine Navy? A Navy which will be smaller, but more modern and more capable?

Missions

Today, in accordance with the Soviets "new defensive doctrine" and their long-standing concepts of having "a unified military strategy" and conducting "combined arms operations"; the Soviet Navy is tied, in war, to the Continental Theaters of Operations. The "basic missions of war of vital importance to the state" assigned to the Soviet combined arms forces are to:

- neutralize an enemy's military-economic potential.
- repulse an enemy aerospace attack.
- destroy groupings of enemy forces.

And the Soviet submarine force has a role in each of them:

- the first, of course, is strategic strike to which SSBNs make a contribution.
- in the second, the role of the submarine force is to strike enemy carriers and missile equipped ships before they can launch in order to reduce the level of such attacks that air defense forces must counter.
- in the third, the submarine role is primary against any threat from seaward either to the homeland, Soviet SSBNs or other forces.

But those roles, within the combined arms missions, tend to keep Soviet submarines close to home waters and tied to the war on land. The Soviet Navy has long been pushing for an independent mission distant from home waters in the maritime theaters of operation. A major try at justifying such a mission

was one of the reasons Admiral Gorshkov published his book Seapower and The State in 1978. But, it failed. Within a year a second edition of the book was published with significant revisions highlighting that the "strategic employment of the navy" meant "coordinating its efforts with the actions of other branches of the armed forces to achieve common goals in an armed struggle on the basis of a unified military strategy."

But the Navy did not give up. After the promulgation of the "new defensive doctrine" in 1988, Admiral Gorshkov's supporters published the book I have already mentioned: The Navy: Its Role, Employment and Prospects for Development. That book, once again, tried to justify an independent mission for the Soviet Navy, far from home waters in the maritime theaters, even within a defensive doctrine. The Navy wrote that, within the combined arms mission of; *repulsing an enemy aerospace attack...The primary role of navies...will consist of hunting and destroying in sea and ocean theaters the principal strategic weapons platforms; i.e., strategic missile submarines, surface combatants armed with long range land attack cruise missiles as well as aircraft carriers.*

Indeed, the book went so far to suggest that: *in the immediate foreseeable future the mission of battling (SSBNs) can move to the level of a national mission and, then, one can speak of national anti-submarine defense just as we can speak of national air defense.*

What a great attempt to create a mission which provides justification and support for substantial increases to the Soviet submarine force! Unfortunately for the Soviet Navy, we have no evidence that their effort to acquire that national mission succeeded. On the other hand, it is probably fortunate for the Soviet Navy, because neither do we have any evidence that, if it had been assigned, they would have been able to accomplish it.

But, the Soviet Navy has not been deterred in its search for an independent, distant mission. Recently Admiral Chernavin published two lengthy articles on anti-SLOC warfare. This may be the beginning of a new effort to create a new, distant, independent mission for the Navy within the current defensive strategy. If that mission were assigned, it would provide ample

justification and support for substantial increases in the Soviet submarine force. Whether this effort will be any more successful in winning the Soviet Navy and submarine force the independence, distant operations, and increased force levels so long desired, is, as yet, unknown.

Optempo

Meanwhile, not only assigned roles but economic constraints keep the Soviet Navy close to home. On Soviet Navy Day in 1989, the Deputy CINC of the Soviet Navy, Vice Admiral Makorov, announced that the Soviet Union has taken steps to reduce substantially the number of submarines (deployed) both in seas and oceans (specifically, the Pacific and Indian Oceans and the Mediterranean Sea).

Indeed, based on the new defensive doctrine and economic constraints, Soviet naval optempo has been declining since 1986. The greatest decrease in 1989 was among nuclear-powered attack and cruise missile subs (SSN/SSGN). That decrease can be attributed, at least in part, to concerns about submarine reliability and safety in the wake of the MIKE accident in April and ECHO II accident in June. And, they were right to be concerned because there was another accident in December. The most visible indicator of this reduced submarine force optempo is a decrease in Soviet submarine presence in the Mediterranean; from a former average of 3 to 5 units to a level of 2 during 1989. There have been complete gaps in the deployment patterns of nuclear attack and cruise missile subs to the Mediterranean.

Future Employment

Thus, today, the roles assigned the Soviet Navy within the new defensive doctrine require the submarine force to conduct its wartime operations in waters close to home. Not only that, but the need to maintain high surge readiness during a period of economic austerity has required the submarine force to cut the number of submarines on distant deployments and reduce its optempo.

But, what if the Soviet submarine force is not employed in that manner in the future? And, it will not be, if the Soviet Navy can help it. After all, these are naval officers in command of a major world Navy. They want to act like that.

As I have indicated, the Soviet Navy has continued to press

for an independent mission which will let them operate, independently, on the high seas, distant from the homeland. So far, they have not had much success. But, come wartime, even if they are confined to their current roles within the strategically defensive strategy they certainly don't expect to remain within sight of land. As Admiral Chernavin has said; *What does defensive mean? Certainly people have a simplistic and primitive understanding of this. They think that since we have adopted this doctrine, we should be purely passive... How can a warship fight today if it sits in the trenches? Submarines should find the enemy's ships and sink them.*

Vice Admiral Markov is the Navy representative on the General Staff and clearly an officer who knows how the Navy will operate under the General Staff's control in implementing the unified military strategy. Recently, he gave a speech to a group of westerners in which he extolled the defensive nature of Soviet strategy and the Navy. He said; ... *we see our four fleets having as their major task the conduct of defensive operations in those areas immediately adjacent to the USSR... These areas are the Barents, Baltic, Northern Sea of Japan and Sea of Okhotsk...* . **But** he also said; *Other factors which influence our naval strategy are lines which, when crossed by vessels armed with SLCMs.... Our response is a submarine buildup and we are obliged to send aircraft to intercept and monitor vessels that come into those areas.*

The admiral then went on to warn that; *A submarine can be, based on mission tasking, an offensive or defensive weapon. The tasks we set our submarines are: Prevent buildup of large groups of surface ships in areas sensitive to us and, in peacetime, the monitoring of such groups.*

Even more explicit were the statements in a recent article by a Captain First Rank. In defending Soviet acquisition of the aircraft carrier based on the wartime need for such a platform, he described the Soviet perceived U.S. naval threat to USSR and, then said; *Only the Navy is capable of neutralizing this threat. It would be impossible to accomplish it by concentrating our forces near the coast. One must go to the areas where the enemy's forces are deployed, squeeze them out of there and, if war begins, engage in combat with them.*

In short, while Soviet submarines may be confined to areas

close to home waters today, the Soviet Navy doesn't expect to let that happen when the threat is imminent.

Summary and Conclusion

In summary then, the Soviet Navy remains a submarine Navy. In the future, the submarine force will become smaller, mainly because of the removal of old, obsolete and non-operational diesel and first generation nuclear units from the force. But, it will be more modern, with an increasing portion of that force being third generation nuclear submarines. Those units are far more capable than the units they are replacing. Furthermore, a fourth generation of nuclear submarines will eventually enter the force. That generation will have a number of high tech advances over today's submarines. In accordance with the "new defensive doctrine", that smaller but more modern and more capable Soviet submarine force has been assigned roles within the new defensive strategy which require it to operate in areas close to home waters.

I conclude that, to the Soviet General Staff, all this makes sense. They consider themselves "military-scientists." They use history and mathematics as the basis for the development of strategy and plans.

The Soviet General Staff military scientist assigns a value to each piece of military equipment and each unit to indicate its "combat potential." Thus, it is mathematically possible for a small, modern and highly capable force to have an aggregate "combat potential" which is equal to or even higher than the "combat potential" of a large, obsolete and inoperative force.

That is what the Soviet Ministry of Defense and General Staff are striving for as they direct and guide the future development of the Soviet Navy and its submarine force: To maintain or somewhat improve its overall level of "combat potential" while reducing its size.

But the "military scientists" don't end their calculations there. After having calculated the aggregate "combat potential" of their own forces, they try to calculate the "combat potential" of the expected enemy force. Then, they compare the two to determine which force has the greatest aggregate "combat potential" or which holds what they call the "correlation of forces."

While they are now receiving guidance and funding to only

maintain or somewhat improve the aggregate "combat potential" of the Soviet Navy, the Soviet military-scientists fear, in the worst-case, a dramatic increase in the aggregate "combat potential" of the U.S. Navy. Or, at least, no decrease. That's why they are pushing naval arms control.

But, lacking success there, the military scientist of the General Staff needs to take further action to assure the Soviet Navy continues to hold the "correlation of forces" over the threat. That action is not to let the needed "combat potential" go cruising off into areas of the world's oceans from which it cannot be quickly recalled to add to the "combat potential" of the defending forces and, thereby, assure the "correlation of forces" over an enemy threat. Also, it is not to disperse the "combat potential" of the Navy over a wide area where some of it may not be positioned to be brought to bear rapidly to assure the "correlation of forces" on the enemy axes of attack.

Rather, the best way in which a smaller force, with only some modest increase in "combat potential" can be assured of holding the "correlation of forces" over a perceived growing enemy threat, is to concentrate all of its "combat potential" more densely in the expected areas of attack. That is what the General Staff is striving for as it assigns the Soviet Navy its roles and directs its operations close to home waters in support of Soviet defensive strategy.

In short, in planning and guiding the future development and employment of the Soviet Navy and its submarine force, the "military-scientist" of the Soviet Ministry of Defense and General Staff will use their mathematical approach to assure that the Soviet Navy, despite being reduced in size, improves its "combat potential" by becoming more modern and capable and maintains the "correlation of forces" over the perceived U.S. naval threat by concentrating its forces at the point of expected attack. That is what they are doing now as they put the finishing touches on the naval portions of the next five year plan. The Soviet equivalents of SCN, R&D and O&MN are being set to assure the "correlation of forces" against the U.S. Navy as they see it today and as they expect it to evolve over that period and beyond. They intend to be able to meet the threat.

One last thought. What if we don't maintain the U.S. Navy

and pose the threat the Soviets expect and are planning for? What if we cut the Navy even further than now discussed? What if we pull back dramatically from our forward force posture? We, then, will be reducing our "combat potential" and limiting the axes on which we can pose a threat. As the Soviet "military scientists" see those actions and redo their calculations, they will see their "correlation of forces" improving, their advantage increasing. What if, then with some combat potential to spare, they let the Soviet Navy undertake some of those independent, open ocean operations for which they have been pushing for so long? Will we be able to meet the threat?

■

The Most Difficult Warfare Task Is The ASW Challenge.

Many of our undersea warfare systems perform multiple tasks and are critical to meeting today's evolving threat.

Sonars that seek out hostile submarines. Combat control systems for integrating sensors and weapons systems. Sophisticated, on-board training devices that develop, sharpen, and maintain the skills of shipboard personnel.

Submarine Signal Division is developing the CCS Mk 2 combat control system. It modernizes and standardizes equipment and software used in the U.S. Navy's submarine fleet. In addition to performance and operability improvements, the new system will reduce costs.

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FORCE COMMANDER'S FORUM
COMMANDER SUBMARINE FORCE, U.S. ATLANTIC FLEET

Vice Admiral Roger F. Bacon, USN

Today, I am not going to provide you with the normal recap of SUBLANT operations this past year. I won't tell you about USS SILVERSIDES' operations in the Arctic and then in the Pacific or about their circumnavigation of the North American continent -- the first in 30 years.

I don't intend to go into the successful completion of our D-5 testing program or talk about the first deployment of USS TENNESSEE armed with the TRIDENT II (D-5) missile. TENNESSEE is now on her second deterrent patrol.

I'm not here to make any bold new statements about the Soviet Navy. Despite the increased East-West dialogue, we all know that under President Gorbachev, the Soviet strategic arsenal has improved.

We all know that the Soviets have six classes of submarines in series production and that they are incorporating quieting technology into every new and overhauled submarine. We know that the Soviet Submarine Force outnumbers our own by a three to one margin and that the submarine is the capital ship of the Soviet Navy. My concern, is just as stated by Admiral Trost; **the qualitative improvements** they have made.

As our uniformed and civilian leaders work to educate the Congress to ensure we maintain a Navy and submarine force capable of prevailing against the increasing Soviet quality, there is another broad challenge we face -- and it's one we have faced before.

So, rather than talk with you about those trends and our significant events of the past year, I want to discuss a single operational event last year which provides much insight into the type of operations our submarines are conducting now, and will be ready to perform in the future.

That's why I've titled my presentation "Back to the Future." Today, I want to emphasize that our challenge in 1990, and in the years ahead, will be not only to stay proficient in our well-practiced missions of sea control, ASW, anti-surface warfare, and strategic deterrence, but also to renew our emphasis on the built-in versatility of the nuclear-powered attack submarine

for employment in other missions in what has come to be termed a multi-polar world.

As our CNO points out, submarines are players in this type of world. As we look to the future, we need to look back as we work to strengthen our proficiency in the spectrum of expanded missions that the nuclear submarine can uniquely perform. Many of these roles were performed by our boats in World War II... many by our boats since then, and as recently as the past year. Although I cannot give you all of the operational details, I can for the first time give you a general summary of a 1989 real world operation in which submarines played a vital role.

On 28 July 1989, the Israelis captured the Hisballah cleric Sheik Obeid. On 1 August, the hostage Colonel Rich Higgins was reported murdered by his terrorist captors in Lebanon. How did the Navy respond to this?

The world watched as USS CORAL SEA, and USS IOWA battle groups deployed off Lebanon; USS AMERICA returned to the North Arabian Sea; and USS RANGER and USS FORRESTAL prepared for contingency operations.

As the CNO reported in his annual testimony, and I quote, *The August 1989 marshalling of naval forces off Lebanon is only the most recent example of the often repeated story that when a crisis breaks out, the first question is... "Where are the Carriers and when can they be on scene?"* Air superiority is the crucial ingredient.

But, the unseen capability during this contingency was our forward deployed submarines. I can think of no other recent real world event that illustrates our submarine strengths more than the hostage crisis. Our boats clearly demonstrated the point made by Admiral Cooper that *The fundamental characteristics of a nuclear submarine -- covertness, mobility, endurance and offensive firepower -- are ideally suited for support of U.S. policy in most Third World crisis.*

But **people**, our submarine crews, are the main factor in employing those inherent submarine attributes. Our people have always been our greatest asset and they always will be. They performed superbly in this contingency, doing the difficult tasks with seeming ease and making the impossible, possible.

Stealth - The on scene operations of our six, multi-mission

capable, fast attack submarines were all accomplished totally undetected, but were absolutely vital to the U.S. Navy presence. Our boats proved the true meaning of stealth in the Eastern Mediterranean in 1989, just as they continue to demonstrate it every day.

Mobility/Speed - I sailed a submarine from the East Coast, with a complete change in weapons loadout -- overnight -- and she transited to the Med in six days, less than half the normal transit time. Another submarine joined the operation from the North Atlantic. The speed is there, and we use it when needed.

Endurance - Nuclear submarines, as you well know, can operate unsupported for months in contingency situations, which is of great value to an operational commander far removed from bases and logistics support.

Our 46-year old tender USS ORION operated in the Eastern Med along with our 43-year old submarine rescue ship USS KITTIWAKE for 41 days, supporting the submarines and even some of the surface ships involved in this contingency.

Firepower - The firepower of an SSN in a low intensity conflict role encompasses much more than the traditional torpedo. We can not only successfully engage all targets at sea, we can complement and support carrier striking power ashore.

Of course, as a maritime Nation, the main mission of our attack submarine force, at any level of conflict, will be to provide the forward defense necessary to ensure the sea lines of communication remain uninterrupted. If necessary, in the event of hostilities, our SSN mission will be this simple; to sink ships.

In addition, the TOMAHAWK cruise missile on our boats provides a credible long range surface and shore strike capability. The mere possibility that a TOMAHAWK capable submarine is operating in a given theater, has no doubt already been an effective deterrent and peace keeper. As land based forces are drawn down in Europe, the concept of the forward strategy, the unrestricted use of the seas and the deterrent value of submarine launched cruise missiles will become even more important.

The TOMAHAWK capability reminds us that the fast attack

nuclear submarine is a great force multiplier. Although I cannot tell you about specific contingency missions which were assigned, I can tell you the type of support these submarines were trained and on-station ready to provide:

- Our bread and butter missions -- ASW and ASUW;
- Strike Warfare, through our TOMAHAWK capability;
- Special operations support;
- Mine Warfare;
- and Surveillance.

In the early phase of a regional conflict, we can all envision a potential requirement for surveillance and special operations. This is another capability we had on scene in the Eastern Mediterranean. The ability to deliver special operation forces -- completely covertly -- is an important factor in a crisis such as this.

The capability to launch special operations forces from our attack boats adds to the already high credibility of the undetected submarine.

Once launched, these forces can perform virtually any mission required: from surveillance, intelligence gathering and target designation planning; to actual missions against enemy shipping or shore targets.

Insertion of special forces by rubber raiding craft, as opposed to air insertion, is much less susceptible to counter detection either visually or by air search radar.

Clearly, the submarine's ability to operate undetected while remaining ready to perform these missions is unique. No other platform or area of warfare can claim the multi-mission effectiveness and stealth built-in to our submarines. The unparalleled effectiveness of the submarine in low intensity conflict has been proven in a recent real world situation. And should the need arise again, in any corner of the world, we will be prepared to do the same.

We cannot afford to gamble on the likelihood or non-likelihood of a regional crisis. If we have learned anything from the past, it's that the only predictable thing in the world events is their inherent unpredictability. Again, as Admiral Trost has emphasized, we live in an unstable, competitive world.

As we reflect on the SSN capabilities we quickly and quietly assembled in response to the 1989 hostage crisis, we can

envision the potential requirement to provide the same support for a battle group commander in this or some other corner of the world.

Looking Back to the Future, our SSNs should remain in demand for a variety of missions; including everything from their traditional roles to a convincing but undetected response to a variety of threats.

Just as in the crises which have occurred in the past decade in which the Navy has responded, COMSIXTHFLT, Vice Admiral J. D. Williams', Carrier Battle Group was there in 1989 to provide that visible stabilizing influence of raw power if it were needed. In the Med, there is an axiom -- **where the battle group goes, the submarine force goes with it.**

Our covertness prevents a heightening of tensions while having an on-scene capability. The implicit threat of a multi-mission capable forward deployed SSN, serves a great deterrent to would be regional aggression. But if the deterrence fails, in times of heightened tension, the SSN has the capability to conduct long term covert surveillance or presence missions and rapid on-scene response when ordered. SSNs have an important role in a low intensity conflict scenario. We have the capability and must continue to work to refine it in this era of violent peace.

All of you in the Naval Submarine League are well familiar with our way of life embodied by the words -- stealth, mobility, firepower, speed and endurance. This past year, I would add readiness, submarine force readiness to go in Harm's Way. We were ready last August and we will stay that way.

As we look to the future, the significance of submarines in executing national policy during Third World crisis will increase as Third World nations acquire First-World sophisticated weapons and submarine platforms.

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FORCE COMMANDERS FORUM
COMMANDER SUBMARINE FORCE, U.S. PACIFIC FLEET

Rear Admiral Michael C. Colley, USN

Good afternoon Ladies and Gentlemen. I have been thoroughly enjoying my tour in the Pacific. Its a great job, and I believe we have a very solid team.

Who would have thought at our last symposium one year ago that such sweeping changes would subsequently take place in Europe; and that the calls for significantly reducing our force levels would be right behind.

While these remarkable events have certainly been for the good and have had a big impact on European defense planning, they have not made much difference in the Pacific. The Pacific Submarine Force is still engaged every day in the enormous task of keeping our vital Western sea lanes of communication open and in executing extremely difficult front-line ASW. The Pacific is a critically important **Maritime** economic theater. It contains two-thirds of the world's population and produces two-thirds of the world's Gross National Product. In fact, total U.S. trade with Asian nations is 45 percent greater than that with European states and this imbalance is increasing. The future in the Pacific promises to be fast paced, exciting, and of great continuing importance to our nation. The Pacific Submarine Force will be an integral part of this growing vitality.

Last fall, the force played a major role in the largest post-World War II fleet exercise in the Pacific, PACEX-89 The objective of this two-month long exercise was to conduct fleet operations in a simulated, conventional war scenario in support of CINCPACFLT OPLAN FIVE THOUSAND. The basic concept was to deploy our submarines out in front of the carrier and battleship battle groups, rapidly transit the submarines to patrol areas, and to conduct simulated anti-submarine ship warfare. The force demonstrated extraordinary readiness. Nearly all of our submarines were underway, with no prior warning, within 48 hours of exercise commencement; underway loaded with weapons, food, and spare parts. All three SUBPAC tenders were similarly underway within 80 hours, enroute to their forward refit sites. Each tender was

also fully loaded with weapons, food and repair parts. One hundred hours into the exercise, SUBASE San Diego, our largest homeport, was deserted.

The tender USS MCKEE deployed from San Diego to Cold Bay, Alaska, where she met up with OMAHA. OMAHA moored alongside MCKEE to simulate reloading torpedoes and the repair of a major sonar system fault. This simulated casualty was repaired using an actual component obtained from the manufacturer, and flown to Cold Bay from Manassas, Virginia. MCKEE also provided support for the airhead, which was established at the runway in Cold Bay. This support was in the form of site security, berthing, and communications. The weather in Cold Bay proved to be our most powerful adversary, with bitter cold temperatures driven by over 60 knot winds.

In early October, COMMANDER SUBMARINE GROUP FIVE, then Rear Admiral Dave Oliver, embarked in MCKEE. He assumed control of all SUBPAC forces for a time after a simulated bomb had destroyed the COMSUBPAC Headquarters. DIXON, our other San Diego tender, deployed after her last tended submarine was ready for sea, and anchored in Wilson Cove, near San Clemente Island. She provided voyage repair services to FLASHER, returning from war patrol with simulated battle damage. PROTEUS, meanwhile, deployed from Guam and anchored at Majuro, Republic of the Marshall Islands, a small atoll in the South Pacific.

BUFFALO, on patrol, moored alongside for actual repair work as well as repair of simulated battle damage. BUFFALO was underway again within 24 hours and PROTEUS continued on to Manus Island, Papua, New Guinea, to establish yet another forward refit site. The rapid deployment of our tenders demonstrated our continuing ability to provide effective battle damage repair, full reprovisioning, and sustained forward support of the submarine force.

At sea, our submarines were also very successful, once again proving the tremendous offensive capability of the modern attack submarine. Several SSNs were diverted to provide realistic ORANGE opposition to the surface battle forces as they transitted to the Western Pacific. In the Eastern Pacific, five SSNs simulated attacks on sixteen warships. In the

Northern Pacific, nine ships were engaged and simulated sunk, and in WESTPAC we had equally impressive results. Overall, PACEX-89 demonstrated our ability to rapidly deploy the force on short notice and to carry the conflict west and north. We also provided that we can sustain our force, on station, indefinitely.

On the strategic side, TRIDENT, our nation's premier strategic deterrent force, continues to prove its robust reliability, survivability, and flexibility. Under the SSBN continuity of operations program called SCOOP, we have conducted several innovative exercises with the objective of ensuring the survivability and logistic support of our SSBNs in any threat environment. Our principal goal has been to test our ability to resupply and repair, if needed, TRIDENT submarines at remote locations throughout the Pacific demonstrating independence from the base at Bangor. In December, MICHIGAN and PERMIT moored alongside DIXON to demonstrate multiple mooring and resupply capability at Ford Island in Pearl Harbor. DIXON provided all necessary support services to both ships, including torpedo reloading of MICHIGAN. In March of this year, MCKEE conducted a remote replenishment of HENRY M. JACKSON while at anchor off Monterey, California. MCKEE used small boats to shuttle supplies to the TRIDENT submarine where they were subsequently onloaded.

The watchword of the SCOOP Program is innovation. We do not limit ourselves to "traditional resupply ships." We have proven that any large ship can be used as a support platform. For instance, we had ALABAMA alongside USNS MAURY, and oceanographic survey ship, at Bangor. This class of ship has sufficient space and weight to carry spare parts and supplies to a TRIDENT SSBN in a remote location. We have even pressed the Coast Guard into service; and used the icebreaker POLAR SEA to resupply OHIO. To assist in remote replenishment, we had "yokohama fenders" built to provide separation between ships. They can be collapsed down to facilitate transportation. In each of these exercises we have made great strides toward developing the capacity to moor and resupply without the need of tugs in a reasonably protected area. The added flexibility that these remote refits afford the

operational commander is tremendous. I think that we have been extremely successful in achieving our objective.

In keeping with our desire to rigorously test ourselves in remote areas of the Pacific, COMSUBPAC, represented by GURNARD, together with COMSUBLANT's SEAHORSE, recently conducted ICEX 1-90 in the Arctic Ocean. Under the direction of the Arctic Submarine Laboratory's Captain Chuck Armitage, a temporary floating ice camp, APLIS-90, was established about 200 nautical miles north of Alaska's north slope. More than 650 hours of dedicated submarine support services were provided to the 85 scientists and engineers representing over a dozen naval and civilian laboratories in the rigorous two weeks of active camp use. We tested various new types of equipment, studied oceanographic, acoustic and physical properties of the Arctic Ocean; and conducted training in the rigors of submarine operations in the harsh Arctic environment. Every objective of this complex operation, developed and planned over the preceding 16 months was accomplished with what the Secretary of the Navy, who visited the camp and GURNARD, described as "complete professionalism." ICEX 1-90 was far and away the largest Navy effort ever undertaken in the Arctic. GURNARD and SEAHORSE later surfaced at the North Pole. ICEX 1-90 once again demonstrated the ability of the Submarine Force to operate in the harshest environment in the world.

As I have described, we are continually looking for new ways to show the multi-mission, all-purpose capabilities of the modern submarine. We have frequently demonstrated our ability to project power in conjunction with special operations forces. Last year, for the first time, SAM HOUSTON deployed to the Western Pacific with her drydeck shelter in place. She participated in several Allied and U.S. exercises and tested the full range of her capabilities. Although SAM HOUSTON is scheduled to be deactivated at the end of this year, CAVALLA, TUNNY, BATES and KAMEHAMEHA have been or will be configured to carry the drydeck shelter. This will ensure our continued participation in the important special operations mission.

With the growing threat of low intensity conflict in Third World Nations, the conventional TOMAHAWK Land Attack

Missile gives us the flexibility to conduct precisely targeted strikes throughout the Pacific theater while maintaining covertness. The introduction of the Vertical Launch System 688 class submarine gives us 12 missiles in addition to a full load of torpedoes. We also maintain our ability to monitor the activities of potential adversaries through covert surveillance.

By maintaining a very flexible and multi-mission force, I am confident that we are prepared to meet any challenge. I believe strongly that the worldwide strength of our Navy has significantly contributed to the remarkable political changes we have witnessed since we last met. The Pacific Submarine Force is ready to meet the challenges of the 90's. **We are involved in something important**, and we need your continuing support.

■

IN REMEMBRANCE

Rear Admiral Edward C. Stephan, USN(Ret.)
Decorated Submarine Veteran of World War II

Captain Robert B. Satterford, USN(Ret.)

EXTRACT FROM REMARKS
By The CHIEF OF NAVAL OPERATIONS

Admiral Carlisle A. H. Trost, USN

Leningrad Naval School, USSR.
Thursday, 12 October 1989

This morning I want to discuss several topics so that you know exactly how I feel on some subjects that I think are of our mutual interest. My comments are of value to you only if I speak with complete candor, Naval Officer to Naval Officer. Empty rhetoric or mindless propaganda benefit no one. If we are to succeed in our efforts to reduce tension, we must each understand the position the other takes on issues of mutual interest or concern.

I preface my remarks by saying that we are living in an era of enormous change. Just as I stated earlier that I never expected to be addressing you during my tour as Chief of Naval Operations, it is equally difficult to predict what the next few years may bring. However, to put my remaining comments in context, there are three things that I think will remain constant for the foreseeable future. First, the United States is a nation that relies on the sea for its economic and political livelihood. Second, the Soviet Union is the only nation in the world that has the capability not only to challenge our way of life, but perhaps even to destroy its very existence. And third, independent of the actions of the United States and the Soviet Union to reduce tensions, the rest of the world is becoming more economically inter-dependent, while concurrently becoming more independent politically and militarily. For this reason, I think we can expect to see a relative decline in the influence that the Soviet Union and United States exert on the actions of individual nations. With those thoughts in mind I am going to speak about the U.S. Maritime Strategy, Naval Arms Control, and the future international security environment as I see it. First, U.S. Maritime Strategy.

A few years ago, as I am sure you are well aware, we published our Maritime Strategy in open literature. Since then this document has been the subject of controversy both in my own country and around the world. The U.S. Maritime Strategy is the maritime component of the overall U.S.

National Security Strategy. It is not a war plan. Nor is it a document that outlines a predisposition of naval forces to wage war. The Maritime Strategy is a concept, repeat **concept**, of operations for the effective global employment of naval forces to protect the interests of the United States and our Allies and support our national policy objectives. It is the same strategy that the United States has pursued in the name of peace for the past forty years, and is based on three fundamental tenets.

The first tenet is deterrence. Its purpose is to deter any potential adversary from either attacking the United States and our Allies, or attempting to undermine the economic and political interests on which we rely. The strategy is sufficiently broad to cover the employment of naval forces across the entire spectrum of conflict, ranging from global nuclear or conventional war down through regional conflicts in peacetime and crisis.

Secondly, the strategy is built around a network of alliances. Since World War Two, the United States has established agreements with over forty countries to provide mutual security for common defense. The strength is not in the military power of any one individual but the combined strength of the alliance in which each member shares the burden of defense. Granted, the United States is the leader in these alliances. In the coming years I expect to see many of our Allies begin to assume greater responsibility for the common defense. This may be particularly true with NATO. I think it is important to note that in the forty years that NATO has stood united and kept the peace in Europe, there has not been a single aggressive act by any one of its members against a nation in the Warsaw Treaty organization.

Third, and probably least understood and possibly most worrisome to potential adversaries, is the premise of forward deployment.

Now, some argue that forward deployment poses an offensive threat. Among them is Marshall Akhromeyev, who, on a visit to the United States in the summer of 1988, looked me in the eye and said, *You, you're the problem. Your navy and bases surround my country and threaten the security of the Soviet Union.* My response then and now is the same. The

United States strategy is not intended to threaten anyone. Geographic reality is such that many of our Allies and trading partners are located on the periphery of the Eurasian landmass. If the United States is to effectively participate in mutual defense of our own and our Allies' interests, it is imperative that we have forces deployed close to regions of potential conflict. In the last several years the United States has placed increased emphasis on the role of naval forces in forward deployment because of the changing international environment. Since 1950, there has been a 60 per cent decrease in both the number of overseas basing facilities and number of host countries for our forces. But, there has been no decrease in our overseas interests. Quite the contrary, the United States relies more heavily on overseas trade than ever. Forward deployed naval forces give us the flexibility and mobility to continue to protect these interests. They are only a threat to someone who would intend to threaten our interests or those of our Allies.

The second topic I want to address is Naval Arms Control. The purpose of any negotiation for Arms Control must be a meaningful improvement in the security posture for all of the participants. While force reductions may produce reduced governmental spending as a by-product, that cannot and should not be the principal focus. The goal must be improved stability. Unfortunately, I think our respective definitions of stability are somewhat different. The writings, speeches, and proposals of some of your leaders lead me to believe that you view stability as being synonymous with predictability. Predictability, if it means that restrictions are placed on the movement and composition of ships on the high seas, can foster a climate ripe for deceit and adventurism. My definition of stability focuses less on attempting to limit, through agreement, a potential adversaries' options, and more on the well understood, historically demonstrated national policies of the countries involved, and the deterrent effect of these countries operating viable forces in their regions of interest. The principles that may govern stability on land cannot be translated to apply equally on the high seas. Navies don't occupy territories. All nations have free and equal access to the seas. Naval forces by virtue of their mobility and global access can

be concentrated to deter and then just as quickly depart without the adverse implications or difficulties involved in the use of land forces. And while Naval forces don't singularly win wars, their absence can certainly result in the loss of wars, especially if one nation is dependent on the sea. On that point I'm sure we are in agreement.

Many of your leaders have stated that the single most significant obstacle to the continuing improvement in relations between the U.S. and the Soviet Union is our reluctance to entertain the inclusion of Naval forces in overall arms control talks. That may be so from your perspective, but in my view such statements fail to recognize the fundamental differences between our respective geographies and National Security requirements. The United States is an island nation. Two of our states, Alaska and Hawaii, are separated from the mainland of the United States by thousands of miles of ocean. The vast majority of our trade is with nations across the great expanse of the Atlantic and Pacific Oceans. And again we are critically dependent on this trade for economic survival.

Contrast that picture with your own country. You are virtually self sufficient in basic energy and strategic requirements. The states of the Soviet Union are all on the same land mass. Your principal Allies and trading partners are also on the same landmass. Seaborne trade for the Soviet Union is not a matter of national survival.

So, when viewed from this balanced perspective, I strongly feel that my country's reluctance to enter into naval arms reductions is justified by the facts and is a prudent and rational position.

Let's look at a few specific proposals that members of the Warsaw Treaty Organization and some others have offered. One calls for the exclusion of anti-submarine capable forces from specific security zones. Another calls for the exclusion of all Naval force activity in certain strategic straits and high density shipping lanes. Other proposals seek to limit the scope and number of naval exercises, and when such exercises occur, provide for advance notification and the embarkation of observers. Still others seek to restrict the movement of ships that may be armed with nuclear capable weapon systems. In each case, I interpret these proposals as attempts to abrogate

commonly accepted international law with respect to freedom of the high seas. Any one of these would result in the inability of my Navy to protect the global interests of the United States or to deter aggression. Naval forces must be free to operate when and where deterrent presence is required, and operate unimpeded by restrictive sanctions.

To those who would argue that my position on these measures is intractable, let me remind them that our two countries already have formal and informal measures which have proven effective in reducing the probability of conflict on the high seas. The Incidents At Sea Agreement of 1972 has enjoyed remarkable success in preventing inadvertent mishaps between U.S. and Soviet Fleet units. The Stockholm Accord of 1986 already carries stipulations that require advance notification of naval exercises within specific limits. The Madrid Mandate will expand on the Stockholm Agreement to include other naval activities, if such activities are functionally linked with operations on land. And this past summer when Admiral Crowe visited the Soviet Union, he and General Moiseyev signed an agreement to reduce dangerous military incidents in regions where the Armed Forces of our two countries routinely operate. These are all sound agreements that result in an increased measure of stability, but do not impinge on any nation's free use of the high seas.

Another topic that seems to surface frequently when arms control is mentioned is sea-launched cruise missiles. I understand that the Soviet Union views the U.S. sea-launched cruise missile capability with concern. You, as military men and learned strategists, can appreciate it when I say that it is intended to concern you.

More than twenty years ago your Navy embarked on a weapons building program whose sole purpose was to target and counter U.S. aircraft carriers. The Soviet Navy developed a powerful Naval Air Arm, potent submarine force, and blue water surface force all capable of carrying large numbers of cruise missiles, many with nuclear warheads -- and each one targeted against our aircraft carriers.

In response, we felt we were left with no option but to develop a capability to disperse the surface and land strike assets that were previously concentrated only in our manned

aircraft aboard carriers. Hence, the sea launched cruise missile was developed and is now deployed on surface combatants and submarines. In addition to complicating an adversary's targeting effort, the cruise missile gives fleet and battle group commanders another asset for a measured response, and one which does not endanger airmen's lives in striking targets at sea or ashore.

I strongly oppose any negotiation that would impose undue restrictions on cruise missiles at sea. Contrary to what some may say, I believe that compliance with restrictions would be unverifiable without unacceptably intrusive inspections. I noted with interest some articles that appeared last August concerning the verification experiment conducted on board one of your Slava Cruisers. I'm referring to the experiment that was jointly sponsored by the Soviet Academy of Sciences and the Natural Resources Defense Council, the latter being a group of scientists and academicians who are not official representatives of the United States, but nonetheless technically knowledgeable. In essence, they concluded just what I said, that unintrusive verification is impossible using the tested techniques.

But more importantly, from my perspective, limits or reductions on cruise missiles would again make the U.S. Navy's Seaborne strike capability reside solely in our aircraft carriers. And, then, your cruise missiles would again be aimed primarily at our carriers. This poses unacceptable risks to our ships, our people, and would severely inhibit my Navy's ability to protect our global interests.

That brings me to the last topic on arms control I intend to discuss -- U.S. Aircraft Carriers. In the past year, some of your country's leaders have suggested that the United States should retire or place in storage half of our aircraft carriers in return for your retirement of about a hundred of your submarines. Such proposals do not reflect an understanding of the basic differences in economic and political dependencies between our countries. The aircraft carrier is the backbone of the United States Navy. When combined with supporting surface combatants and logistics ships, it provides a mobile, flexible, and self sufficient base to protect our interests and deter would be aggressors. In the past year we have seen

examples where the presence of a carrier battle group positively influenced an otherwise potentially volatile situation. The USS NIMITZ steamed off the coast of Korea during the Olympiad in Seoul. Prior to the games there had been much rhetoric from the North Koreans about interrupting the games with violence. The presence of the NIMITZ strongly discouraged the North Koreans from following rhetoric with action. Carrier battle groups on station in the North Arabian Sea and Indian Ocean have added a strong measure of deterrence to keep the fragile cease-fire between Iran and Iraq intact. Most recently, the presence of the USS CORAL SEA and AMERICA battle groups in the Eastern Mediterranean halted the barbarous threats to murder more U.S. and foreign hostages being held captive by state sponsored terrorists in the Middle East.

The United States currently maintains fourteen deployable aircraft carriers. At fourteen, we are barely capable of maintaining our peacetime commitments in regions of the world where the stability they bring is required for peace. I must emphasize that every nation in the world community, not just the United States, benefits from the forward deployed presence and resulting deterrent effect of our carrier forces.

And let me add that these fourteen carriers are all front-line operating units, unlike the submarines your leaders propose to retire in exchange. It is clear that most of these submarines have surpassed their useful service life and will be retired anyway.

The last topic area I want to briefly address is the future security environment as I see it, and the implications it has for Naval forces. As I said earlier the world order is changing and many of the changes we see today may continue independent of actions by the United States or Soviet Union. We are witnessing a dispersion of power centers with a greater emphasis on economic influence than on military power. The relative world position of the superpowers is decreasing. The improving relations between our two countries may result in an overall reduction in the amount of money that both of us spend on our militaries.

But there are some other things going on in the world which are not so positive. The proliferation of sophisticated

weapon systems among many nations in the world should trouble everyone. We've seen the indiscriminate use of chemical weapons by Iran and Iraq. Many other countries are building facilities to manufacture their own chemical weapons or are trying to buy them from others. Many nations that can't feed their hungry populations are buying or building cruise missiles. By the year 2000, some intelligence estimates predict that 15 or more countries will have the capability to produce and launch ballistic missiles. The prospects for the proliferation of nuclear weapons are not much better.

Terrorist groups, many of which are sponsored and supplied by legitimate states continue to be the scourge of the civilized world. International drug cartels are getting rich at the expense of young people all around the world. In both instances, the values of human life and decency are absent.

Before your questions, I'll conclude my remarks with this observation. All of us in this auditorium are military men. More than anyone else we have seen and understand the suffering and pain of war. Our governments' principal charge to us is to deter war so that the warfighting skills we have trained long and hard to master will never be required. I am hopeful that this new era of understanding between our two countries will result in a world where our successors will not feel threatened by any nation. But the world has a long way to go to meet that goal. Trust and confidence in the intentions of other nations, including reluctance to use force to attain national goals, comes with time and corresponding actions that reflect those qualities. Our elected governments will control the speed of these developments in our two countries, and hopefully they can influence the rest of the world community to direct their energies in the same direction. In the interim, we, the military, must remain ready to defend our nations' security interests. We must do so not by fancifully trying to assess the intentions of a potential challenge or threat, but by assessing the reality and true capability of those who may pose a threat. The citizens of our countries deserve nothing less.

I wish you fair winds and following seas. Let our crossings on the great oceans be signalled with friendship and respect. Thank you. ■

EXTRACT FROM REMARKS by COMMANDER SUBMARINE FORCE, U.S. ATLANTIC FLEET

Vice Admiral Roger F. Bacon, USN

SUBGRUSIX Change of Command, Charleston, S.C.
on 13 July 1990.

Our nation needs a powerful and efficient Navy to guarantee the peace. And the credibility of the United States Submarine Service is one of the key reasons why we're seeing the many positive changes in other corners of the world. The submarine's inherent and unique strengths of stealth, mobility, endurance, firepower, cost-effectiveness and multi-mission capability will continue to serve our nation and our allies well into the next century.

Two weeks ago today, at the Chief of Naval Operations change of command ceremony, Secretary of Defense Cheney acknowledged that we have seen some landmark shifts in world affairs and in the assumptions on which our defense is based. But, at the same time, he warned that, *Regional conflicts and terrorism remain real threats to U.S. and Allied security; (that) dangers of this kind of conflict are magnified by the spread of chemical and nuclear weapons; (that) Soviet military capabilities remain significant; (and that) the Soviet Navy is still bringing new, advanced vessels on line -- creating a smaller but more advanced force, designed for potential out of area operations.*

The Soviets **themselves** are acknowledging their intentions and direction. In fact, during the recent visit of a Soviet surface action group to Cuba, the first such out-of-area deployment to Cuba in two years, Soviet Rear Admiral Alexander Gorbunov publicly confirmed that quote, *we're reducing the quantity but raising the quality*, unquote.

Therefore, the prudent posture, as Secretary Cheney emphasized, *in this global environment -- U.S. military power, including naval superiority, remains a prerequisite to peace. Our strength provides stability at a time of turbulence and change. We can't afford to let Soviet intentions substitute for American capability in guaranteeing U.S. security. That guarantee is our job.*

In 1990 and in the years ahead, to ensure we can keep that **guarantee** and capability to deter conflict, or to prevail if

deterrence fails, we have to keep qualitatively ahead of the potential competition. The ships and submarines of Group Six and Ten are the **best in the Navy.** But the best today, will obviously face stiffer competition in a year or two especially in view of the continuing Soviet commitment to the modernization of its submarine fleet.

The world indeed may be a safer place than a year ago, but the sweeping changes we are seeing will make the world and global interrelationships less stable rather than more stable, at least for the foreseeable future. As we hear talk of what program to cut and where to spend the peace dividend, we should remember that our national security is not an either/or proposition.

The "peace dividend" is freedom. It is our values and way of life **today.** But where will it be tomorrow without the strength that brought fundamental changes to the world?

Deterrence -- whether strategic or conventional -- has been described in many ways, but Mark Twain best illustrated it with a short story that goes like this: *The other day two bull dogs met. They circled each other, snarling and growling. But both of them were bluffing, so nothing happened. And they were about to walk off when one of them opened his mouth. He had no teeth so the other dog tore him to pieces.*

Although dramatic reforms have taken place in the world, the maritime component of our national military strategy, which is fundamentally based on our dependence as an island nation, has not changed. Each month 1500 ships leave or enter U.S. ports to sustain our way of life. That maritime dependence must be protected now **and in the future.**

Although the threat of nuclear war and the invasion of Europe may have decreased, the threat from the Soviets rapidly modernizing and increasingly capable submarine force has not. Recent intelligence reaffirms that the Soviets are firmly committed to attack submarine development and production.

As an operator for the past four years, in operational command of the best submarines in the world today, I can tell you we will need the SSN-21, the SEAWOLF, to sustain our superiority and ability to maintain freedom of the seas to support this nation.

- current classes of submarines cannot incorporate the improvements necessary to meet the projected threat.
- the SSN-21 program is eight years into execution, is on schedule and has met all requirements.
- there is no reasonable alternative to the SSN-21.
- delaying authorization of follow-on ships will increase program cost.
- delaying authorization will also erode the already fragile submarine industrial base, and

again, as an operator, a submarine sailor out at sea with my boats on a continuing basis for the past four years, I can assure the American public that delaying authorization of follow-on SSN-21, SEAWOLF submarines will eventually forfeit United States undersea superiority. I am **confident** that our elected leadership will not let that happen.

As the national debate on "how much defense" continues, we should not lose sight of the essential element of our readiness -- ships -- and trained people to take those ships to sea.

With the TRIDENT II and SEAWOLF submarines we will have the ability -- the **teeth** of deterrence -- to stay ahead of Soviet improvements and growing Third World capabilities. And with a trained corps of professionals, like the dedicated people of Submarine Groups Six and Ten, we will have an unbeatable combination that will enable us to fulfill the guarantee of which Secretary Cheney spoke.

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CORRECTION

In the July 1990 issue of The SUBMARINE REVIEW, NSL inadvertently credited the discussion on page 84, **Soviet Views of the U. S. Submarine Role in Carrier Groups**, to Lt. Paul W. Siegrist, USN. The author, in fact, was Dr. Harold W. Gale, PE. We regret any inconvenience caused by our editorial oversight.

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MEMOIRS TEN YEARS AND TWENTY DAYS

By Grand Admiral Karl Doenitz.
Translated by R. H. Stevens with an Introduction and Afterward by Professor Dr. Juergen Rohwer.
Naval Institute Press 1990 - ISBN 0-87021-780-1

Reviewed by Daniel A. Curran

Admiral Karl Doenitz's memoirs are a classic of submarine literature and should be reread every so many years to absorb the lessons from that period and relate them to the present. As originally published in 1958 and in English in 1959, the memoirs reflect the personal experience of Doenitz from his war diaries. He uses references to both Captain Stephen Roskill, R.N., The War at Sea; and Winston Churchill, Second World War to accommodate the Allied side of the Battle of the Atlantic. The edition published by the Naval Institute in 1990 contains new material in the Introduction and Afterward by the German historian, Juergen Rohwer.

The new material is the result of historical research by Dr. Rohwer and others, particularly on the official documents, that have been declassified by British, American, and Canadian sources subsequent to Admiral Doenitz's publication in 1958. Of particular importance is the disclosure by Group Captain F. W. Winterbotham, in his book, The Ultra Secret, that the British had successfully broken the German "Enigma" cipher machine and the similar naval version. We now understand better the inter-relationships between technological developments, operational concepts, and tactics displayed by both sides during the war. Rohwer describes the profound effect of radio intelligence on the Battle of the Atlantic by the Allies.

Rohwer's Introduction describes the reaction by Doenitz when, after the initial publication of the memoirs, Rohwer personally revealed to him the effects resulting from the use of HF/DF equipment by the British and the greater shock, the news in 1974 that the British had in fact broken the "Enigma" cipher and had decrypted most of the signal traffic from the U-boats and headquarters from June 1941 to January 1942 and from December 1942 to the end of the war.

The Afterward provides a short summary of the historical research and its effect on the earlier perceptions of causes of the changing fortunes in the war. Guenter Hessler, Doenitz's son-in-law and author of The U-Boat War in the Atlantic (reviewed in the April issue of The SUBMARINE REVIEW by Captain Charles Rush), divided the Battle of the Atlantic, the longest campaign of World War II, into eight phases. Rohwer redefines the timing of the phases with an accurate description of what was happening with regard to the decryption of signal traffic on both sides of the conflict.

The issue in Rohwer's writing is not whether Doenitz and the U-boat command appreciated the potential effect of breaking the German cryptographic traffic from a strategic point of view nor the pin point accuracy of the automatic high frequency direction finders (HF/DF) aboard the Allied ships from a tactical view -- he (Doenitz) mentions and then discounts the potential of both in his memoirs; but rather the over-estimation by the Germans of the effect of the 9 CM radar on anti-submarine warfare by the Allies. The use of radio transmissions, key to the operational concept of the U-boat wolf packs, not only provided the Allies with the necessary information to reroute the convoys and develop other strategic thrusts, but was used tactically to devastate the U-boat forces in 1942 and 1943. Juergen Rohwer's Introduction and Afterward should be read to understand the Battle of the Atlantic more fully.

I will leave the review of the memoirs to more expert hands. However, there are a few observations about the memoirs that can be made that have more to do with historical perspective than historical detail. First, Doenitz and the U-boat command understood the Allied strategy explicitly and understood the effect of seapower on that strategy, particularly the effect of submarine warfare on the Allies' logistic lines. The upper level political and military commands of Germany had no appreciation of the total strategy of the Allies and no understanding of the effects of seapower. As a result Doenitz received neither the number of submarines nor the necessary industrial priority until it was too late in the war. Second, the much vaunted submarine research and development effort by the Germans took too low of a priority. The snorkel and

other advances came too late to have any effect on the outcome of the war. On the other hand, the Allied research on anti-submarine warfare produced the tools for the ultimate defeat of the U-boat forces. Third, the debate in the U-boat command on which was more important -- larger numbers of ships or fewer more capable ships, is a recurring argument in every major navy and certainly is a key issue in the Congress of the United States at the present time.

Memoirs Ten Years and Twenty Days with the new introduction and Afterward belongs on the submariners' bookshelves.

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MUD, MUSCLE AND MIRACLES
MARINE SALVAGE IN THE UNITED STATES NAVY

By Captain C. A. Bartholomew, USN
A Joint Publication of the Naval Historical Center
and the Naval Sea Systems Command
ISBN 0-945274-03-3; 1990; 505 pages

Available from Superintendent of Documents
U.S. Government Printing Office, Washington, DC 20402
Reviewed by Captain Gerald Sedor, USN(Ret.)

"MARINE SALVAGE - A science of vague assumptions based on debatable figures taken from inconclusive experiments and performed with instruments of problematic accuracy by persons of doubtful reliability and questionable mentality."

After the humorous opening definition of marine salvage quoted above, Captain "Black Bart" Bartholomew presents a most impressive, well documented and highly readable account of Navy divers and salvors over the past century which completely disproves the quoted definition. Assisted in his efforts by Commander Bill Milwee, USN(Ret.), Lieutenant Commander Bill Bladh, USN(Ret.), and Vice Admiral Dave Johnson, USN(Ret.), the author manages to accomplish a most difficult task -- to document a century of history with thousands of people involved in hundreds of events and make it

interesting for both the diver/salvor and the lay person. From the initial group of torpedo recovery divers stationed at Newport, RI in the early 1880s to the multi-service group involved in the recovery of the space shuttle CHALLENGER debris in the late 1980s, Mud, Muscle and Miracles succeeds in capturing the essence of Navy diving and salvage by focussing on the most important aspect of that or any other organization -- the people that make it happen.

If you're in the least bit interested in this superb work and want to find out more about it, the Foreword written by Admiral I. C. Kidd, Jr., USN(Ret.) provides a fascinating personal insight into the world of divers and salvors (*...the absolute epitome of all that is fine in mariners ...*). Encouraged by his father (himself a diver) to seek and take advice from divers (*...It will always be the very best available...*), Admiral Kidd concludes that his father's words on this subject were the best pieces of advice ever passed along to a son!

The author provides insight and extensive accounts of Navy salvors involved in all four categories of salvage: (1) afloat and stranding salvage, (2) harbor clearance, (3) submarine salvage, and (4) deep-ocean operations. While a majority of the book is devoted (and rightfully so) to the enormous harbor clearance and ship salvage efforts of World War II, submarine salvage (World War II and prior) and deep ocean search operations using current technology are given adequate coverage. In addition, the evolution of salvage doctrine, management and organization in the U.S. Navy is given an excellent overview.

For submariners who are most likely quite familiar with the deep ocean searches for THRESHER and SCORPION, the rescue and salvage operations on SQUALUS and the pierside flooding of GUITARO in a naval shipyard (all adequately covered), some of the early submarine search, rescue and salvage operations provide some interesting reading. One of the reviewer's favorites is the salvage of USS SKATE (F-4) (SS 23) off Oahu in 1915. Lost with all hands in over 300 feet of water, the 142-foot, 400-ton SKATE was the Navy's first submarine loss and first deep ocean salvage operation. The motivation for salvage was to determine the cause of the loss. Navy salvors responded to this first submarine disaster by

diving to unprecedented depths (over 300 feet on air), developing the basic design of submarine pontoons and employing a system of lifting with the pontoons that would serve as a model for future submarine operations. With the successful deployment of pontoons built at Mare Island Naval Shipyard, SKATE was salvaged and the cause of her loss identified as the erosion of pressure hull rivets as a result of battery acid leakage. Subsequent design changes were implemented to solve this problem.

An interesting personal sidelight of the SKATE salvage involves Chief Petty Officer William Loughman, one of the divers assigned to the operation. In one of his dives below 300 feet, Chief Loughman became entangled and was subsequently rescued by Chief Petty Officer Frank Crilley, who was later awarded the Medal of Honor for this feat by President Coolidge. This reviewer, having a personal acquaintance with Chief Loughman's son, Ray, (a former manager of EBDIV, Groton), gained further insight into the character of these early divers in a recent discussion with Dottie Loughman, Ray's widow. Enlisting in the Navy when he was barely into his teens, William Loughman lived and breathed Navy throughout his entire life. A Chief Petty Officer at the time of the SKATE loss in 1915, William Loughman went back on active duty during World War II and continued his love affair with the Navy while serving at SubBase New London.

Another interesting submarine salvage operation of that era involved the grounding of USS GARFISH (H-3) (SS 30) in December 1916 off Eureka, CA. When the armored cruiser USS MILWAUKEE (C 21) attempted to free up GARFISH, she was eventually forced ashore and broke up. GARFISH was eventually moved overland on wooden tracks and rollers and relaunched into deeper water. However, the lack of salvage seamanship on MILWAUKEE resulted in the complete loss of that ship.

From the time of the SKATE's loss in 1915 until World War II, a total of 14 navy submarines were sunk in accidents. Of these 14, a total of 9 were salvaged, the last of which was USS SQUALUS off Portsmouth, NH. This rescue and salvage operation saw the first use of the McCann rescue chamber (37 survivors) and the first operation to use helium-oxygen mixed

gas for divers. A total of 648 dives were made, with only two cases of decompression sickness. For their efforts in this operation, four Navy divers were awarded the Medal of Honor. In all these cases Navy salvors responded with vigor and professionalism, despite the fact that each accident was handled separately and no permanent organization existed in a state of readiness to support such casualties.

In summary, Mud, Muscles and Miracles is an extremely well put together descriptive history of the men and events that shaped the Navy's diving and salvage efforts over the past century. The highly readable text is liberally interspersed with over 160 photographs, illustrations, maps and diagrams. The Appendices include such details as the U.S. federal laws affecting navy salvage and the characteristics of all salvage-related ships that have served the U.S. Navy. The extensive bibliography and index are a major plus for the serious researcher of Navy diving and salvage history. Negative comments from any objective reviewer would have to be considered as very minor. A personal bias on the part of this reviewer on the need for more coverage of current and future technology (e.g., autonomous underwater vehicles) would perhaps detract from the author's rightful focus on people rather than machines. The diving and salvage community and, indeed, all associated with the Navy, owe Captain Bartholomew an enthusiastic "Well Done" for this excellent publication. ■

THE BONEFISH FIRE AND THE PEOPLE WHO SAVED THE SHIP

by Rear Admiral W. A. Owens, USN

I want to tell you about an event which has deepened my conviction of the importance of the people and the training we have developed in the submarine force over the years. You may recall that BONEFISH, the last diesel submarine in the Atlantic, was in the vicinity of the Bahamas three years ago, when a fire in the battery area caused the captain to abandon ship and left us with the problem of recovering and bringing her back to Charleston. I had the privilege to be in charge of the rescue operation at sea, an experience that I won't soon forget.

I was sent out with a handful of young people (a couple of them BONEFISH sailors who happened to have been on leave or had stayed back in Charleston for training) to see what I could do about bringing the submarine back to port. Recognizing that the ship was taking on water and that the conditions inside the submarine were unbelievably difficult for salvage, I arrived on the scene and was helo-ed out with my party to one of our frigates in the KENNEDY battlegroup which was steaming in the vicinity.

Conditions on BONEFISH were absolutely terrible, the air in the submarine was totally contaminated, having been filled with the residue from various laminated formica installations, burned cables, various fluids, hydraulic oil, and battery chlorine. This required anyone entering the submarine to be in a Scott breathing apparatus rather than an Oxygen Breathing Apparatus which was not efficient enough. It was dark on the ship, sea state was five, the ship was taking 30 degree rolls and pitching about 10 degrees, and it was extremely difficult to get back and forth from the frigate to the submarine. The only option was rubber boats with difficult boarding conditions on both ends. The submarine was taking on water in the torpedo room and the stern room, and when we arrived on scene, was about six or seven degrees down by the bow with water up to the foot of the sail.

It was necessary to enter this hellish situation, stepping over dead shipmates, finding the right valves, getting the valves shut,

pumps established, and securing the submarine on the surface before we could tow her back to port. The importance of this effort was not only because of the salvage value of the submarine which was perhaps as high as 40 million dollars, and the recovery of the three fellows who had died in the fire, but also because of the obvious ramifications for the rest of the submarine force.

During that two-day time at sea with BONEFISH there were several realizations that convinced me of the irrefutable wisdom of the way we run today's submarine force. First, Admiral Dan Cooper as SUBLANT had sent me with the authority to do whatever was necessary to save the submarine and he was there to buffer me from the rest of the world. I had only to make reports to him in the interim, and only when I was ready to make them. I had to answer to no one else. His role was purely that of support for the effort. That structure in the final analysis gave me the room to do what was necessary to oversee the salvage of the ship with the knowledge that every effort would be made to send help if I needed it. But what I want most to tell you is that the quality of the young BONEFISH sailors in knowing their ship, in knowing those 5,000 valves and switches, in knowing where they were in this pitching, rolling, ravaged hulk in pure darkness, and utterly contaminated atmosphere, were the factors that resulted in saving the ship. **Their ability** to enter the submarine with seven minutes on an air pack, get to remote areas, operate required valves, establish valve lineups and get the submarine in a condition where we could salvage it were feats only a submariner could appreciate. I have never been more impressed with basic submarining than I was with those young fellows. It was **the** factor that saved BONEFISH.

Lastly, I have never been quite as touched as I was by the general level of concern for their shipmates demonstrated by the men on the two frigates, the submarine rescue ship, and the carrier that were on scene. I will always remember JOHN F. KENNEDY, a thousand yards off BONEFISH's beam at a time when we thought we might lose the ship. Kennedy was making a lee for BONEFISH so we could do what was required to prepare for an airblow to the ballast tanks. I will never forget, after two days on station, a muster of the frigate

crew at two o'clock in the morning. All of us were dead tired, but the need to get back on board BONEFISH for yet a final effort of damage control was mandatory. Sea state was still 4 or 5, and the boat crews, having performed marvelously for the previous two days, were so tired that they were no longer functional. The captain of the frigate gathered the crew on the fantail of the ship. I explained the situation and asked if there were any volunteers to go to BONEFISH, drive the boats and operate the auxiliary equipment topside, recognizing the very difficult situation that existed on the submarine. I'll always remember that **every man** in that 200 man crew raised his hand, and I was touched. It is truly these fine young people who man our Submarine Force and our Navy and the dedicated feeling we have toward one another that makes it all worth while.

The Soviets sailors associated with the lost YANKEE and the MIKE may have found themselves in not too different a set of circumstances than what we found on BONEFISH. My understanding of the way they operate and train is reconfirmed by the fact that their efforts to save their two ships were unsuccessful while ours was successful. And I'm proud to consider myself an honorary member of BONEFISH! I will always remember, with Admiral Cooper, that memorial service in Charleston when we remembered the crew, their efforts and the three shipmates who died in the ship. This touching experience cemented forever my bond to the finest submarine force in the world. It is these kinds of people who operate our TRIDENT submarine program, it is these kinds of people at every level, be it the 3-star or the troops on board our submarines that will **ensure for the long term** that TRIDENT will remain the keystone of deterrence that it has come to be accepted as at all levels from the President to the Secretary of Defense to the man in the street.

■

THIRD WORLD DETERRENCE?

Mr. David Evans of the Chicago Tribune raises some intriguing points in his recent letter on Third World Deterrence (July 1990 REVIEW). However, it is my impression that the Navy has no need whatsoever for a "...new lightweight, single warhead (ballistic) missile" in order to respond to "the sinister machinations of Third World dictators."

This role is filled by the TOMAHAWK Land Attack Missile (TLAM). Cruise missiles offer a more effective means of dealing with a Third World threat in that they are more accurate than ballistic missiles, they're dual capable (i.e., they can carry either nuclear or conventional ordnance), and they are carried by a number of different platforms (specifically SSNs). This latter point is essential in preserving the security of our SSBN force.

TLAMs are already in the arsenal, so no costly development program for a new missile is necessary. Also, their dual-purpose capability provides the operational flexibility vital to our national command authority when dealing with Third World threats.

Shane D. Deichman
Naval Ocean Systems Center

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THE BRONZE STAR

[In reply to Bud Gruner's proposal in the April 1990 SUBMARINE REVIEW]

I am a Marine Infantryman with thirty-seven months in combat. I was awarded a Bronze Star with Combat Distinguishing Device (V) for individual valor in combat. I am aware that the Bronze Star can also be awarded for Meritorious Service but the various service Commendation Medals or the Meritorious Service Medal are now considered the appropriate recognition for **individual** meritorious service.

Bud Gruner's assertion that those awarded the Combat

Infantrymen's Badge also receive the Bronze Star is **WRONG.** The Army might have watered down the Combat Infantry Badge's status by reducing the 30-day requirement of World War II, Korea and Viet Nam in order to award the device to those who participated in Grenada and Panama. It also appears as if the requirement for combat in an infantry unit could be relaxed to allow, what are normally not considered combat arms, to qualify for the Combat Infantryman's Badge but the Bronze Star has not yet been turned into a **Unit Award** or **Campaign Medal!** It's bad enough one service routinely gave out the Purple Heart for the simple act of ejection from an aircraft during Viet Nam. For what was, in retrospect, an extremely low cost operation against what, in most wars, would be considered light and scattered resistance, another service virtually rained down personal decorations on an inordinately large percentage of its participants at Grenada. The Bronze Star is an individual award. It was never meant to be a campaign medal or unit award. Combat Action Ribbons, Submarine Combat Pins and Combat Infantry Badges, and the like, are the appropriate recognition for individual participation in group service in an activity that is recognized as above the norm in danger or difficulty. Only a small proportion of the Marine Infantrymen who wear the Combat Action Ribbon or Army Infantrymen who wear the Combat Infantry Badge also wear Bronze Stars.

As a Reconnaissance Marine, I have served aboard five submarines, although admittedly not in combat. My brother is a career submariner. I can understand the desire for recognition of what is service out of the ordinary. I cannot condone it though if it entails further cheapening of what was once a highly prized and honored award.

LTCOL William J. Tehan, III, USMC

■

SUB SCHOOL SIGN

PLEASE HELP! During WWII the main entry of the Submarine School had a sign quoting from Pericles' speech to the Athenians prior to the Peloponesian Wars. The Submarine School no longer has that sign nor its exact wording.

However, with research, they identified the source. It came from Thucydides' "History of the Peloponesian Wars, Book 1, Section 142."

Pericles was addressing the Athenians concerning the Athenian Navy's ability to keep the Spartan Navy bottled up in their home port such that the Spartans would be unable to practice the art of naval warfare. Pericles then said something like this:

Their lack of practice will make them unskilled, and their lack of skill will make them timid in battle.

I've seen various translations of this passage. None of them seem to be the exact words that made such a life-long impression on me. Perhaps the School paraphrased some translation. Even so, I have a need for the School's words.

If you have papers or photos from the Submarine School's WWII years, please see if you have the exact wording the School used. If you find it, I would deeply appreciate receiving a copy.

Many thanks for your help!

CAPT William A. Whitman, USN(Ret.)
9815 21st Ave. N.W.
Seattle, WA 98117
(206) 782-8278

■

NEW VINSON HALL FACILITY

Vice Admiral Charles H. Griffiths, USN(Ret.), President of the Navy Marine Coast Guard Residence Foundation, announced that the Foundation is naming its new extended care facility in McLean, Virginia in honor of Admiral Arleigh Burke.

The Arleigh Burke Pavilion is the Foundation's way of saying thank you to Admiral Burke for his years of dedication to Vinson Hall, the Foundation's residential retirement home for sea service officers. Admiral Burke, one of the Foundation's early benefactors, was instrumental in obtaining the land upon which Vinson Hall is built and raising the initial contributions for its construction, Admiral Griffiths stated.

The Arleigh Burke Pavilion, a handsome two-story building

which will serve 100 residents, is now being built on the property adjacent to Vinson Hall and is scheduled to open in February, 1991.

The Pavilion, like Vinson Hall, will be a place where those who have given so much to their country can live in dignity, security and friendship among friends and former comrades.

Navy Marine Coast Guard Residence Foundation

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IN THE NEWS

▪ Inside the Navy of 25 June reported that the submarine Industrial Base issue had been raised: "Top-level Pentagon officials Donald Atwood and John Betti this week recommended that Secretary of Defense Dick Cheney consider cutting in half the U.S. Navy's nuclear submarine shipbuilding base in the first round of briefings in the Department of Defense's Major Warship Review, according to informed sources. The move is likely to launch a major Navy lobbying effort to reverse the recommendation before the review is made final next week, these sources say. But they add that the Navy may have a difficult time reversing the decision because of Navy plans to cut SSN-21 SEAWOLF production from three ships per year to two ships per year in FY-92.

"Sources say that Atwood, Deputy Secretary of Defense, and Betti, Under Secretary of Defense (Acquisition), don't support the sharp per-ship cost increase that the Navy would suffer if it kept two submarine yards open while building only two SEAWOLFs per year. While the exact figures are classified, sources estimate that the per-ship cost of SEAWOLF would jump from $1.25-billion to close to $2-billion in order to sustain the overhead costs of both yards. This assumes the loss of TRIDENT production at 18 ships, according to sources. Neither Betti nor Atwood support this 'inefficiency,' according to sources, and thus are arguing that if two SEAWOLFs are built annually then only one yard should build them.

"While the SSN-21 program seems to be in danger, the DDG-51 program will emerge relatively unscathed with shipyards and industrial base kept in tact, according to an informed source who says that there will be 'no surprises' from statements made earlier by Cheney in the Major Warship Review concerning the projected total amount of DDG-51s. The Navy's program calls for building 33 destroyers, with an estimated cost of $27-billion."

▪ Inside the Navy of 2 July commented on the move to limit the TRIDENT force level. "A movement to forego further procurement of Trident submarines is gaining supporters in both the House and Senate, according to congressional sources. These sources say lawmakers who support such a decision feel that it would be foolish to provide long-lead funding for the 19th and 20th TRIDENTs while any uncertainty remains over the final language of the pending Strategic Arms Reduction Talks (START) treaty which could limit the U.S. to no more than 18 ballistic missile submarines (SSBNs). Even though it is possible that the final START agreement will allow the U.S. to build up to 21 TRIDENTs, many lawmakers are concerned that the expenditure of approximately $2-billion per fully loaded TRIDENT would be wasted if, as expected, future arms control agreements place lower limits on the U.S. SSBN force.

I've been concerned about continuing to build a $2-or $3-billion submarine that we may very well under some future START agreement -- maybe this one -- wind up having to dismantle, Sen. Dale Bumpers (D-AR) told Secretary of Defense Dick Cheney at a defense appropriations subcommittee hearing last month. *That would be folly in the extreme.*

"Negotiations on SSBN and submarine launched ballistic missile (SLBM) warhead limits for the pending START treaty are still continuing in Geneva but arms control experts say it is likely that the U.S. will be successful in attempts to exempt any SSBNs in overhaul or refueling from the START-imposed limits. The Soviet Union has agreed in principle to exempt these SSBNs from the counting rules, according to an expert at the Arms Control Association, a Washington-based think tank. The Soviets have said they would allow 48 SLBM launchers in overhaul to be exempted from the limits while the

U.S. is seeking exemption for 72 launchers. The likely outcome of the ongoing negotiations, said this expert, is that a compromise figure will be reached that will allow the U.S. to exempt two TRIDENTs from the SLBM limit. Each TRIDENT carries 24 missiles.

"Nevertheless, congressional sources say it is extremely shortsighted -- and expensive -- for the Navy to proceed with building more TRIDENTs when future arms control agreements will most likely require further cuts in SLBMs. *At some point we must start to look at START 2 and beyond,* said one Senate source. *We're almost certainly going to come down further on warheads and even if you could justify 21 [TRIDENTs] under START 1, there's no way you can justify it under START 2.*"

▪ NAVY NEWS & Undersea Technology of July 16, in discussion of the Soviet submarine force, reported that they had completed their second nuclear-powered UNIFORM class submarine. They went on to describe the class as ... *The UNIFORM is the only operational Soviet nuclear submarine to feature single-hull construction, and is unarmed.* The boats are used for special operations.

"Propelled by a single pressurized water nuclear reactor, each UNIFORM can carry at least 40 Spetznaz troops for insertion along hostile coastlines. It has the capability to deploy swimmers and is suspected of being able to carry a portable dry deck shelter to house at least one swimmer delivery vehicle.

"The first boat in the class was launched in June 1982 and became operational in 1984. The second was launched in 1987. Both were built at the Sudomech division of the Admiralty Yard in Leningrad.

"The submarines have a surface displacement of 1,600 tons, and a submerged displacement of 1,800 tons. Overall length is 239 feet, five inches with a maximum beam of 23 feet and a draft of 21 feet, three inches.

"The launch of a second UNIFORM is another example of the Soviet penchant for construction of submarines to perform specialized missions."

In addition, the paper further commented -- "Another new class of Soviet submarine which has raised the curiosity of

Western analysts is the X-RAY. This sub was launched in 1984 from the Sudomech facility -- known since the 1950s as a center for engineering innovation -- and completed in 1987. It is the equivalent of the U.S. Navy's NR-1 research submarine.

"Used in oceanographic research, the X-RAY has an overall length of 144 feet, four inches with a beam of 13 feet, one inch and a maximum draft of 14 feet, five inches. Estimated displacement is 450 tons submerged and 325 tons surfaced. It uses a single pressurized water nuclear reactor to produce a surface speed of five knots and a submerged speed of four knots. The X-RAY is unarmed.

"With a hull made of HY 130 steel or titanium, the single X-RAY has a maximum diving depth of 3,250 feet. A crew of six, including one scientist and one technician, is used to maneuver the sub and control its television cameras.

"The American NR-1 was launched in 1969. At 372 tons surface displacement it is slightly larger than the X-RAY, making the Soviet boat by a small margin the smallest nuclear submarine in the world. The NR-1 uses HY 80 steel."

▪ DEFENSE NEWS of August 20 reported on a study recommending a basic change to the U.S. strategic TRIAD --

"The United States should consider eliminating the land-based portion of its strategic nuclear triad as part of a revised post-Cold War defense strategy, a new study recommends.

"The study, titled After the Cold War: U.S. Security for the Future, released last Tuesday by the Washington-based Atlantic Council, also recommends cuts in the U.S. military force structure over the next 20 years totaling about $70 billion.

"The proposals for revising the structure of the U.S. military is part of an overall U.S. security strategy as Cold War tensions recede and global economic competition intensifies.

"The basis for U.S. strategic nuclear forces since the 1960s has been a combination of air-launched ballistic missiles and land-based intercontinental ballistic missiles (ICBMs) collectively called the triad. The study's author, Seymour Deitchman, senior research associate at the Institute of Defense Analyses, argues in his report that silo-based ICBMs have long been considered vulnerable and a source of instability between the superpowers.

"With the advent of extremely accurate D-5 submarine-launched missiles, the U.S. Navy has argued that the seagoing leg of the triad can strike a greater range of targets. The Navy's ballistic missile submarine force remains *the most cost-effective and secure leg of the nation's strategic deterrent capability*, Vice Admiral Daniel Cooper, assistant chief of naval operations for undersea warfare, told the House Armed Services Committee in March."

▪ DEFENSE NEWS of August 20 also reported the results of DOD's Major Warship Review. "The results of the long-awaited Major Warship Review released last week by Defense Secretary Dick Cheney spell continued political trouble for the SEAWOLF nuclear attack submarine program, government and congressional sources say.

"Following a comprehensive four-month review of the SSN-21 SEAWOLF submarine and DDG-51 ARLEIGH BURKE-class destroyer programs, Cheney opted to reduce SEAWOLF construction to three vessels every two years. Original Navy plans had envisioned the acquisition of 10 subs every three years."

-- and went on -- "In action last month, the full Senate voted to forgo procurement of SSN-21s in the 1991 defense budget and instead added two SSN-688 LOS ANGELES-class subs to the budget. The House Armed Services Committee approved funding for only one SEAWOLF. The full House will vote on the defense spending bill when it returns in September."

-- further observing that -- "Reducing the number of submarines built each year also will increase the cost of each SEAWOLF, which has a production cost cap of $1.25 billion per copy.

"While estimates of the likely cost increase are still being debated, the issue *will have a major effect on the Navy's ability to maintain support for the program in 1992* a congressional source observed. He added that rising program costs coupled with pressures to cut the budget even further next year dramatically increase the chances that the program will be canceled."

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NSL ACTIVE DUTY ESSAY CONTEST

(WIN UP TO $500!!!)

Entries are beginning to pour in... articles submitted on or before 31 January 1990 are eligible.

GET EM IN EARLY AND AVOID THE LAST MINUTE STAMPEDE!!

See page 102 of the April 1990 Submarine Review ... or call for details

WINNERS OF THE NROTC-NSL SUBMARINE WRITING CONTEST

The Naval Submarine League and the Chief of Naval Education and Training conducted the first NSL-NROTC submarine writing competition during the spring semester 1990. A number of aspiring midshipman authors submitted bright, fresh ideas on submarine technology, weapons, and tactics in unclassified articles intended for possible publication in THE SUBMARINE REVIEW. Prizes were awarded to the top three entries as follows:

Midshipman 2/C Kenneth G. Copas, Jr. of The Ohio State University was awarded First Prize of $300 for his essay: **The Red October Drive.**

Midshipman 3/C Thomas N. Henderschedt of George Washington University was awarded Second Prize of $200 for his essay: **New Approaches to an Old Game.**

Midshipman 2/C Sean Osterhaus of the University of Virginia was awarded Third Prize of $100 for his essay: **The Use of Submarines in Small-Scale Conflicts.**

Congratulations to the three finalists for jobs well done; we welcome each as one year honorary members of NSL.

NAVAL SUBMARINE LEAGUE
HONOR ROLL

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MEMBERSHIP STATUS

	Current	Last Review	Year Ago
Active Duty	1010	987	925
Others	2970	2979	2891
Life	181	179	166
Student	30	32	25
Foreign	69	64	52
Honorary	24	20	20
Total	4284	4266	4079

HAVE YOU GOTTEN 2 NEW MEMBERS FOR 1990?

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