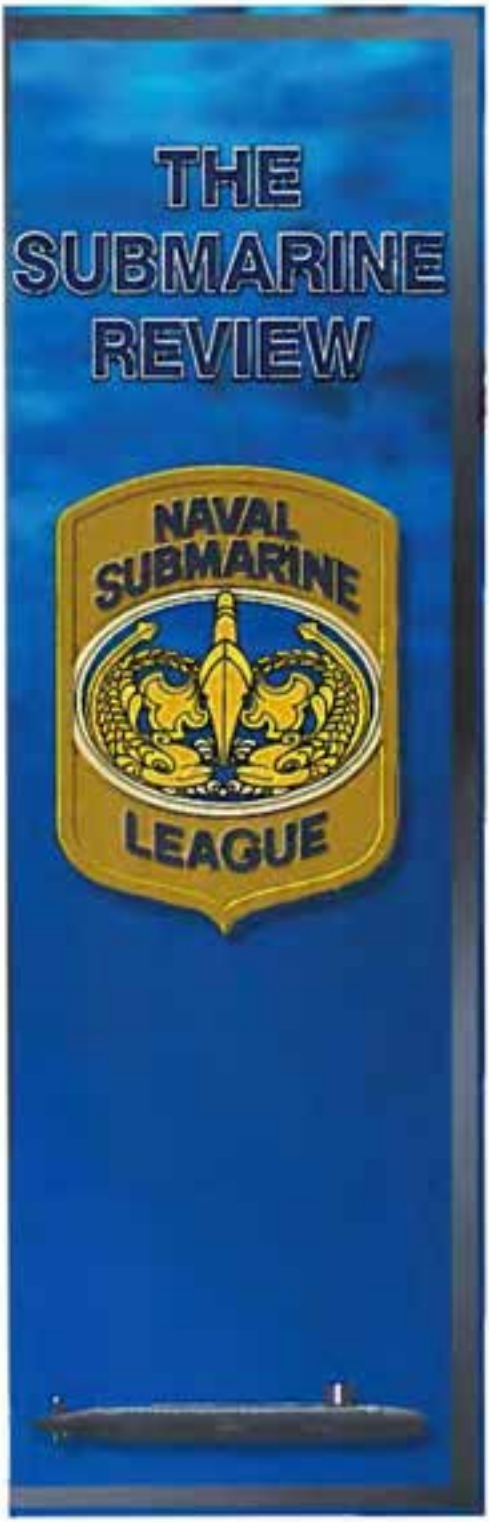

OCTOBER 2006 PAGE

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EDITOR'S COMMENTS

This issue of THE SUBMARINE REVIEW presents a number of articles and arguments, reminiscences and reviews to satisfy a broad scope of reader interest. Unlike many issues, this October edition of the Submarine League's quarterly is not heavily invested with programmatic descriptions or policy statements. That does not reflect any lessening of importance to our members of those matters of ongoing action within the uniformed Submarine Force, it only comes about due to the season of the year and the timing of public statements.

First among our FEATURES section is a memorial piece in honor of Vice Admiral Yogi Kaufman who recently passed away. Yogi is remembered here as a man of substance, a friend, a mentor, a very competent officer, and most particularly, as one who embodied those necessary characteristics of a successful submariner. Our second FEATURE, by CAPT Jamie Foggo is, indeed about one of those ongoing actions within the Submarine Force which is very interesting, innovative and worthwhile. Our active involvement with the diesel-electric submariners of our South American allies should pay high dividends, not only in the present sense of ASW training, but also in future terms of increasing allied naval effectiveness.

The lead article Campaign Goals and Unit Capabilities by Dr. Young is a systems analysis about submarine warfare exchanges ratios. There is a lot of substantive food for thought in that piece, and in Dr. Young's two previous pieces in these pages during the 1980s.There are also two prize winning papers included here. One is by ENS Faherty when he was a Midshipman. He was awarded the Edward L. Beach Prize for Naval History for his account of the early growth of the Chinese Submarine Force. The other awardee is LCDR Mobergh of the Swedish Navy for his Naval War College paper on The Future of Swedish Submarines .

Of particular interest to the World War II veterans, and those following who served with the folks named, is Admiral Joe Vasey's story of a group of submariners who were sent into Yokosuka after the cease fire but prior to the formal surrender. There is even a

coupling given to the Book Review of I-400, and to Thomas O. Paine's account in the April issue of this magazine about taking that boat back to Pearl. They must have been heady days.

In addition, there are two DISCUSSION items which refer to issues brought up in previous editions of the magazine. CAPT Chick Bowling's suggestion for 'splitting the Line' into Engineers and Operators/Weaponeers has foundation in the way most other navies handle the problem of advanced training and at sea experience for junior officers. It has never been used in USN nuclear submarines. CAPT Dave Smith cites the problem of tension between OpTempo and proper maintenance. That's another subject which is always on the table in our high-technology, on-demand community.

And, we even have Sea Stories in which many of us can feel a real sense of having been in the same situations.

Lastly, RADM Tom Evans and CAPT Mickey Garverick have reviewed books which relate past experience (many, many in the case of Submarine Disasters) with modern lessons. Fire at Sea is recommended as part of every submariners reading. Throughout both books retired guys easily can say "That could have happened to me". And the ones still in the boats should be saying "Don't let this happen to me".

Jim Hay

FROM THE PRESIDENT

I hope you all have had an enjoyable summer. The fall season opened with a wonderful event. USS TEXAS (SSN 775) was commissioned in Galveston, Texas on 9 September adding the second VIRGINIA class submarine to the Fleet. VIRGINIA is a Submarine Force success story!

Submarine Force leadership is on the move. RADM Van Mauney relieved RADM Joe Walsh as Director, Submarine Warfare Division. RADM Walsh relieved as Commander Submarine Force, US Pacific Fleet. RADM Jay Donnelly will be promoted to VADM and relieve as Commander Naval Submarine Forces early in 2007. VADM Jon Greenert currently Commander Seventh Fleet has been assigned as Deputy Chief of Naval Operations for Integration of Capabilities and Resources (N8). RADM Mel Williams, currently at STRATCOM will be promoted to VADM and relieve as Deputy Commander Joint Forces Command.

The 2007 Corporate Benefactor Recognition Days are scheduled for 30-31 January 2007. Corporate Benefactors continue to be the foundation of League support. Currently there are 74 corporations actively supporting the initiatives and activities of your League. This event will be the first opportunity for the new Submarine Force leadership to address this forum.

The Naval Submarine League will hold the Sixth Annual Submarine History Seminar on 11 April 2007 at the Navy Memorial. RADM Jerry Holland is setting up the topic and program. It will be another event that promotes the submarine's contribution to our nation's history.

Preparations are well underway for next year's Submarine Technology Symposium (STS) to be held at The Johns Hopkins University Applied Physics Laboratory on 15-17 May 2007. The theme is "***Enhancing the Submarine's Military Value***". VADM George Emery has identified all the Session Chairs and plenary speakers. The Call for Papers has been released. You can find more information about STS on the League webpage. I look forward to chairing a session on Allied Technologies, featuring representatives from key submarine allies.

The Annual Symposium has not been scheduled as of this date. In 2007 the symposium will coincide with the Fall Submarine Cocktail Party. The 2006 Fall Cocktail Party will be on Thursday, 2 November, 2006. We are seeking additional input from the membership on what you would like to see and hear at the annual symposium to make it more useful and informative. Please send your recommendations to the attention of the NSL Vice President, RADM Bruce Engelhardt, USN (Ret.) at the League office by email or snail mail. More information on the 2007 symposium will be provided in the next Review.

I am pleased to report that the League continues to work with our members and Corporate Benefactors to support initiatives that assist the best Submarine Force in the world. There are challenges. The CNO has set a cost goal for VIRGINIA Class submarine at $2B each to allow an increased build rate to two submarines per year. Likewise the Force has been challenged to provide an Advanced Swimmer Delivery System that is reliable and meets mission requirements. The Force enjoys the support of the Special Operations Command for this system.

Your thoughts on what the League can do to fulfill our mission of educating the public on the importance of submarines as a major contributor to our national defense are needed. Please submit them in the form of an article for The Submarine Review. We will continue to put these ideas in front of those who can act on them. League members have the talent, experience and expertise to contribute to the Submarine Force. I commend you for that effort.

Finally, let me wish you a wonderful fall and holiday season and ask you to continue to pray for the safety of our troops deployed all over the world. I am pleased to represent you in the leadership of our League and look forward to our continued success together. Please recommend membership to your shipmates and friends.

J. Guy Reynolds

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FEATURES

IN MEMORY OF YOGI
VICE ADMIRAL ROBERT YOUNG KAUFMAN, USN(Ret)

The Submarine Force, The Navy and the United States of America recently lost a very competent skipper, an excellent officer and a true patriot when Robert Y. Kaufman passed away after fighting a long battle against Parkinson's Disease.

Vice Admiral Kaufman was born in Roanoke, Virginia on April 15, 1924. He grew up in the Washington D.C. area and attended McKinley Tech and Dewitt Prep. He entered the U. S. Naval Academy with the Class of 1946. That was one of the accelerated classes which graduated in three years, on June 6, 1945, due to wartime needs for officers. He requested duty with the Submarine Force and became the first man in his Naval Academy class to *Qualify in Submarines*. Later he also became the first in his class to *Qualify for Command of Submarines*.

He was known throughout the Force and the Fleet and among all within his wide circle of friends and colleagues as Yogi. There were many who wondered about the origin of the nickname and several who conjectured openly, but it is suspected by most that he never confirmed (nor denied) the source. He was not a large man, far from it, but his presence could never be missed.

One aspect of his fame was for his physical fitness and his extraordinary ability in the calisthenics common in military circles. There are many tales of the challenge competitions in which he would do *sit-ups* in the thousands and *one-arm push-ups* with someone on his back. He was also a runner, not a jogger as he often reminded those who commented on his fitness regime, and his endurance matched the effort he put into training.

All of that is really to say that Yogi Kaufman had, in spades, that certain trait which all successful submarine warriors possess and practice—tenacity. And Yogi was a very successful submarine warrior. He served in nine boats and commanded three of them; that's more than the average even in his age of explosive Submarine

Force growth when continuous sea duty was the norm, not the exception. While longevity is admirable, and better to have than not, it is not, in itself, the mark of success. It has long been an axiom in the Submarine Force that "It's not the ship you get, it's what you do with the ship you get". That was especially true in those first couple of decades of the nuclear submarine age when attrition was caused not so much by the normal collisions and groundings as by what the Royal Navy of Admiral Byng's time called "failure to do your utmost"...and Yogi always did his utmost.

While Executive Officer of SEAWOLF (SSN 575), the second nuclear submarine, he helped prove the credibility of nuclear power by impressive demonstration of submerged speed and endurance. He also cemented his own reputation as an excellent shiphandler. In command of CAVALLA (SSK 244) he worked hard to understand and master the then arcane world of submarine ASW. In furthering submarine ASW proficiency he was instrumental in the formulation of a series of curves for firing the Mk 37 torpedo with improved effectiveness. He continued his determined push for excellence, both operational and technical, in his command of SCORPION (SSN 589). During his tour as skipper, SCORPION set a record of 70 days in submerged operations completely divorced from the earth's atmosphere. Yogi was awarded a Legion of Merit for that "exceptionally meritorious service during a period in 1962." Among the other officers on the waterfront in those days his reputation for shiphandling, both submerged and alongside, continued to be burnished by often told tales of skill, confidence, audacity and luck.

Along the way to at-sea command, of course, there were jobs to be done ashore and on staffs. In the early days he was an instructor at the Submarine School. At the beginning of the strategic submarine era, he was the Material Officer on the Staff of Submarine Squadron FOURTEEN as the Navy was preparing to deploy the Polaris missile system in the GEORGE WASHINGTON SSBNs. It was all new in those days; the missiles, the two crew arrangements, the deployed site and its refit/replenishment needs and most importantly, the imperative nature of the mission and the schedule required to meet the challenge. Yogi did well in helping to get all that off to a successful start. Possibly the toughest of all shore duties came after his SCORPION tour with his assignment as Commanding Officer of

the Nuclear Power Training Unit in Idaho Falls, Idaho. In that job he was directly responsible to Admiral Rickover for the instruction of naval personnel in the safe and proper operation of the nuclear power plants in submarines and surface ships. Competence, foresight and eternal vigilance were the operative watch words.

Admiral Kaufman continued his operational experience in the strategic world as the commissioning Blue skipper of USS WILL ROGERS (SSBN 659). ROGERS was the last of the *forty one for freedom* fleet ballistic missile submarines as well as the last of the very modern, very capable BENJAMIN FRANKLIN (SSBN 640) class. He was not content to ride in comfort in his brand-new last ship command, however; and insisted on knowing all there was to know about the mission as well as the ship which was carrying out the mission. Even though WILL ROGERS was the first SSBN he had served in, he brought his inquiring nature, his previous command experience and his fresh set of eyes to look at the FBM way of doing business after six years and many patrols. The modifications in internal routine which he instituted amounted to a positive influence on the entire strategic force.

One of his additional duties while still a Captain was to serve on an *Ad Hoc Panel* of experienced, and very positive, operational and materiel experts in the submarine world. They met in Washington, D.C. to determine the characteristic requirements for a new class of Attack Submarine to succeed the STURGEON (SSN 637) class. Their job was to use modern technology and methodology to consider stealth, speed and depth for optimization of Attack Submarine performance for then-current and projected national security needs. It was a big job and a hard job, but out of that Panel's work came the characteristics of the 688 submarine; which became a class of sixty-two very capable attack boats.

One of the best of the *Yogi Sea Stories* came out of that marathon meeting in DC. It is told that late one evening Yogi, who was a rather short and very bald guy, ventured out to a nearby mail box to deposit his regular letter home to his wife in Groton. As he bent over to read the mail pick-up schedule, three hoodlums jumped on him with apparent intentions for a mugging. They had obviously misjudged their victim's vulnerability because Yogi dispatched all three with varying degrees of injury for their trouble. One version of

the story has it that a fourth cohort, about to join the fun, had rapid second thoughts and departed the area in the getaway car without waiting for his colleagues. That weekend Yogi appeared at a large party in the O Club at New London sporting a bruise on his face and a wide smile, but no one would ask about the bruise. Once again, tenacity and readiness came to the fore.

When Yogi was selected for Flag Rank he was assigned to OP-02, the Submarine Warfare Directorate, as the first Director of the Strategic Submarine Division/Undersea Long Range Missile Systems Program. His job was to transition a concept for at-sea missiles larger, longer-ranged, more accurate and much more effective than Polaris and Poseidon, to a viable program. That concept became the Trident missile system. It was both a completely new Fleet Ballistic Missile system, with a new class of submarine carrier/launcher and a bridge between the older class SSBNs and the new ones. It was a big job and it was handled in a completely professional manner. This time the skill involved was a real ability in maneuvering around the corridors of the Pentagon. It was said at the time that Yogi was his own most effective Action Officer. One of the Air Force officers known for his ability and connections around that circuit asked "How can you Navy guys say that Polaris and Poseidon are absolutely perfect; therefore we need Trident–and then get everyone to agree?" But Yogi managed to explain the paradox to the satisfaction of the decision-makers. On this one, of course, he had a lot of help.

A Joint opportunity presented itself for a wider scope of action when Yogi was named as the Deputy Director of the Joint Strategic Targeting Planning Staff in Omaha, Nebraska.. The nominative Director, of course, was the 4-star Commanding General of the Strategic Air Command, but the JSTPS was a Navy 3-star job in those days and was one of considerable potential as the national nuclear strategy was being reviewed and revised for more refinement of options for the National Command Authority. Many meetings of the smartest and most experienced folks in the broad application of modern strategic thought were held under the aegis of the JSTPS and the results of those deliberations were forwarded to the Secretary of Defense. As can be imagined, during his tenure in Omaha, Yogi was in the center of all that action.

As his last active duty assignment Yogi was the Deputy Chief of Naval Operations for Command, Control and Communications. It is always a terrific task to ride herd on Navy wide communications to improve the effectiveness of the Navy's command and control function. To add to all that, Yogi was given the included job of getting approval for the Extremely Low Frequency (ELF) communication system necessary for world-wide SSBN operations. It was indeed colorful to watch Yogi convince midwestern farmers and hunters that a huge antenna buried beneath their lands would not be harmful to their interests. The proof, as they say, is in the result and the ELF system did become a reality.

He retired from active duty in 1981. For a number of years he continued as a consultant to the Strategic Community and particularly to the Los Alamos National Laboratory. He also embarked on a new career as a wild life photographer with his son Steve. Yogi proved to be as adept with a camera as he was in his previous fields of endeavor. Untamed Alaska was their premier production, and a Tenth Anniversary edition in 1997 was their last collaboration. Yogi continued to support the Navy and the Submarine Force with three widely acclaimed coffee table books. His Silent Chase, Submarines of the US Navy is a classic in a field rarely photographed. When many thought all submarines looked alike Yogi showed them as art subjects, fascinating in their variety. His Sharks of Steel illustrated US, Russian and Japanese submarines. Doing that book yielded yet another *Yogi-tale.* It seems the Russians wished to change the prearranged date for Yogi's visit to a giant Typhoon class missile submarine but Yogi stood his ground and at last the Russians gave in and let him do his visit and take his pictures on his own schedule. The third book is City at Sea about aircraft carriers, an endlessly fascinating subject

This then is the story of Yogi Kaufman, at least as some of his friends, shipmates, classmates and professional colleagues saw him. He was a bit larger than life, but in the final analysis Yogi personified all American submarine skippers: of his generation, before him and after him. He had tenacity, he was technologically knowledgeable and he had vision of his mission. He was also a leader of a special breed of men. Not only free American Sailors, but trained submariners, who can do anything and who know the true meaning

of the terms *qualified* and *shipmate*. That is the real privilege in being a submarine skipper.■

Editor's Note: This remembrance is made up of many inputs from those who knew Yogi. They told their parts from many viewpoints. It is hoped here that the Yogi we all knew will continue to inspire those who are now going down in the sea in their submarines. Yogi's story, as told here, is really for them, and not just for those of us who knew him.

Today, in their own very quiet way, U.S. Navy submarines are involved in more critical covert operations than ever before. From the gathering and sharing of real-time intelligence with joint operations to the ability to serve as sea bases for ballistic missile defense and more, submarines' contribution to the big picture remains absolutely vital. For a detailed overview of how Electric Boat is quietly expanding the range of stealth, visit www.gdeb.com.

Nothing's as powerful as stealth. GENERAL DYNAMICS
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SUBMARINE FORCES AND THE 1000 SHIP NAVY

by CAPT James Foggo, USN
Commander, Submarine Squadron Six

Faced with an expanding set of requirements and a fixed amount of resources in order to maintain a world-wide naval presence, the Chief of Naval Operations recently articulated his vision of a *1000 Ship Navy*, leveraging off the contributions and strengths of our allies and coalition partners. This innovative concept serves as an important ***force multiplier*** in the Global War on Terrorism (GWOT).

In support of the CNO's vision, the Commander, Naval Submarine Forces (COMNAVSUBFOR) has earmarked the potential contribution of 224 submarines from 27 different allied or friendly countries. This additional pool of resources represents both a high and low-end submarine mix, with a variety of capability and propulsion to include diesel-electric, air-independent propulsion (AIP), and nuclear systems.

As Commander, Fleet Forces Command's (CFFC) Executive Agent, COMNAVSUBFOR has cultivated a special relationship with our allies in South America, representing a field of six diesel electric capable countries with a total potential contribution of 24 submarines to the 1000 Ship Navy. Created five years ago under the rubric of the Diesel Electric Submarine Initiative (DESI), there are currently three very active South American participants to include Colombia, Peru and Chile. Eventually, the DESI program could expand to incorporate the participation of Ecuador, Argentina and Brazil.

The concept behind the DESI program is simple enough. With the emerging diesel submarine threat, we rely on our allies to provide the Atlantic and Pacific Fleets the opportunity to train with diesel-electric or AIP equipped submarines. Enlisting the support of our South American allies affords to the fleet the opportunity to train in the location, tracking and prosecution of these high-threat diesel-electric platforms. Honing these skills during pre-deployment training can radically improve Carrier and Expeditionary Strike Group ASW readiness while deployed.

Every good idea has associated costs, but as our Navy continues to refine its *Enterprise* approach to doing business, it should be noted that the DESI program provides an excellent return on the taxpayer's investment. In the first five years of the program, the total investment amounts to $7.76M, but in return has provided over 450 days of ASW training time during nine South American submarine deployments. This amounts to about $17K per day to allow U.S. aviation, surface and sub-surface forces the unbridled opportunity to train on a capable real-world SSK diesel submarine threat. To put this in context, we often pay more than this per day for husbanding services during port visits inside or outside CONUS.

Since the beginning of the program, DESI program participants have proven their professionalism over and over again. On a typical deployment, the SSK remains at sea for 65% of the time. Let's take a look at a typical DESI submarine deployment. During SUBDIEX 2006, the Peruvian submarine, BAP PISAGUA, deployed from Peru on 14 February 2006. Her total deployed time amounted to 160 days, 65% of which was underway OPTEMPO. In return, the U.S. Navy received 75 days of dedicated training time at a total compensation cost of $1.1M or $14.7K per day.

DESI program submarines participate at the *varsity* level with units of the U.S. Navy to include participation in COMPTUEX and JTFEX with our Carrier Strike Groups (CSG) and Expeditionary Strike Groups (ESG). Additionally, South American SSKs have participated in numerous tactical development exercises, anti-submarine warfare exercises, Submarine Command Course (SCC) operations, and various research and development operations. The reviews from participating U.S. Navy units have been highly favorable.

In return for the DESI submarine's participation, there is payback for the allies in the form of training, maintenance and the highly desirable opportunity to work with the world's most sophisticated Navy. Prior to arrival on station, DESI program participants receive training from COMNAVSUBFOR on submarine movement directives (SUBNOTES) and the processing, execution and dissemination of operational message traffic. While in CONUS, DESI program participants are given access to premier training facilities such as the submarine damage control trainers, virtual submarine

navigation trainer, basic sonar operator training, virtual fire arms training simulator, and the submarine firefighting team trainer. All of these facilities are state-of-the-art and highly effective at improving the proficiency of our DESI program crews.

So it is a two way street. We, in the U.S. Navy, get the opportunity to work with some of the finest and most professional diesel boat sailors in the world, while building strong alliances and good will with future coalition partners. In return, our allies gain experience, training, and enhanced readiness through access to our maintenance facilities. In short, it's a win-win situation for both parties.

The combination of American good will, camaraderie, and the inclusion of our submarine capable South American allies in Fleet training and exercises makes for a stronger, more cohesive and interoperable international force. The dividends are obvious for the 1000 Ship Navy. At some point in the future, we may find ourselves in a scenario that requires a continuous submarine presence. It is hopeful, then, that there will be a force of viable and willing coalition partners, to help relieve the stress of an extremely high *optempo* currently maintained by U.S. naval forces. For this very reason, the DESI program should be continued and expanded. It makes perfect sense for the enterprise.■

CAPT Jamie Foggo meeting the Peruvian Submarine PISAGUA when it arrived for a port visit in Norfolk after a FLEETEX in June 2005. He is accompanied by the Commander of the Peruvian Submarine Force, a three star Admiral.

Submarine mooring in Norfolk, VA. US and Peruvian flags flying on the ship! Now that's a great coalition partner.

ARTICLES

CAMPAIGN GOALS AND UNIT CAPABILITIES

by Dr. Henry Young

Editor's Note: Dr. Young is a respected analyst of defense issues with a long history of interest in submarine warfare matters. He had two previous articles published in THE SUBMARINE REVIEW. In the October 1985 issue he authored Setting Goals for a Submarine Campaign and in the January 1987 issue his article was titled Fighting in Defended Waters. This current piece treats the basic issue of the one-on-one warfare which is submarine against submarine operations. He characterizes the ***Campaign Exchange Ratio*** *required by the relative strengths of the opposing submarine forces. As an example, he has set up a situation of a friendly force significantly outnumbered by the opposition and has derived several conclusions as to the potential for the friendlies to prevail.*

There are lessons to be learned from careful attention to Dr Young's conclusions; some editorial assistance has been provided to the reader by putting several of his observations in bold type. I hope this helps, but it cannot cover all that is to be gained as insight. A piece of editorial advice for a first reading is to accept the math he has provided and search for the implications of importance to the submarine community. For the mathematicians among us, as opposed to the engineers, Dr. Young has provided at the end of the article both the logic for his ***Campaign Exchange Ratio*** *and his e-mail address for those interested in a more detailed development of the formula.*

There are implications of numerical strength of the force structure required and there are things to think about in ship, and weapons, characteristics, as the title implies. The operators have to look at doctrine and training to see if Dr. Young's conclusion about the criticality of the first attack is being served.

When one is satisfied that the important observations here have been duly noted, it might well be useful to reread his 1980's articles

in one's complete library of SUBMARINE REVIEW issues. It should be remembered that at the time of those publications the Cold War was still going on and the focus of the US Submarine Force was on fighting in the Soviet Bastions to deny the USSR a viable escalation strategy. The October '85 piece raised the point about the effect of ***time requirements*** *on the campaign and what that meant for both force strength committed and tactics involved. Dr. Young's January '87 article described the probable effect on the* ***Campaign Exchange Ratio*** *of an in-place defense structure of enemy aircraft, surface units and other surveillance systems.*

The question then seems to be whether our analysts can use these imbedded logics to make open source cogent arguments for both quality and quantity in our submarine force structure.

Suppose a force of 100 friendly units aims to eliminate a force of 300 enemy units in a series of discrete, one-on-one engagements. Small-unit actions against terrorist cells, certain forms of air combat, and prowling submarines locked in underwater combat, typify such *search-and-destroy* operations. In a fight to the finish in the example given, each friendly unit must destroy at least three enemy units, on average, for a minimally successful campaign. Setting aside the dynamic and probabilistic aspects of the campaign, the three-to-one exchange ratio translates into a demanding 75-percent average chance of victory in 400 individual battles.

This article relates campaign success to basic combat capabilities of friendly and enemy units and identifies stiff levels of performance for friendly units that guarantee victory, but also highlight its challenge.

Top-Level-Description

The 400 decisive battles can be sorted into clean wins, clean losses, and mutual kills, with fractional probabilities w, l, and a, respectively, constrained by the equation, $w+1+a=1$. In a large number of engagements, friendly units will destroy the fraction, $w+a$, of enemy units and, vice versa, lose the fraction, $1+a$, of friendly units, for a campaign exchange ratio $\frac{w+a}{1+a}$ which in our case, must equal three.

At this level of description, we can freely vary the probabilities,

w, l, and a, that characterize campaigns and find a relationship between a given value of one of these probabilities and allowed values of the other two. In particular, battles that end in mutual attrition—a one-to-one exchange ratio—tend to lower an otherwise higher ratio of clean wins to clean losses.

For instance, let E denote the ratio, w/l, of clean wins to clean losses. Since $w+l+a=1$, it follows that $w = \frac{E(1-a)}{E+1}$ and $l = \frac{1-a}{E+1}$.

Then, the campaign exchange ratio $\frac{w+a}{l+a}$ can be re-written as $\frac{E+a}{1+aE}$ and set equal to three to fix the value of E necessary to achieve the minimum three-to-one exchange ratio for any given probability of mutual attrition (a).

Suppose the chances (in percents) for mutual attrition in one-on-one battles increase from zero-, to 10-, to 20-, to 30-percent. The associated sets of probabilities (w, l, a) of campaign outcomes that achieve a three-to-one exchange ratio are the following,

(75, 25, 0), (73, 17, 10), (70, 10, 20), and (68, 2, 30)

These result tell us that the three-to-one exchange ratio can be maintained only so long as clean losses can be turned into partial victories. At and beyond a 33-percent chance of mutual attrition, this becomes impossible.

UNIT-LEVEL DESCRIPTION

In any case, the top-level parameters w, l, and a, that simply tally the outcomes of a campaign are not independent and freely variable, but collectively depend upon lower-level functional capabilities of friendly and enemy units in one-on-one engagements. In particular, at the next lower level of description, we might consider the following probabilities that characterize important unit combat capabilities:

- friendly units attack first upon contact (p) or not $(1-p)$,
- first attacks by friendly units are lethal (f_1) or not $(1-f_1)$
- counterattacks by friendly units are lethal (r_1) or not $(1-r_1)$

Correspondingly,

- enemy units attack first upon contact $(1-p)$ or not (p)
- first attacks by enemy units are lethal (f_2) or not $(1-f_2)$
- counterattacks by enemy units are lethal (r_2) or not $(1-r_2)$

For the purpose of this discussion, a failure to counterattack and a counterattack that fails are both absorbed in the *not-lethal* outcome.

The parameters that describe the strengths of each side in one-on-one unit engagements still are collectively dependent on lower-level technical, human, and operational factors under each sides' control and not freely variable. On the other hand, each side's engagement parameters can be regarded as independent of each other for the following reason.

At any one time, the values of the engagement parameters are the product of complex interactions between specific systems and practices deployed on each side. However, these systems and practices, in turn, are under continuous development by independent actors in an action-reaction struggle not under either side's sole control. **Since the smaller friendly force must ensure a minimum three-to-one exchange ratio, it is important to identify those sets of unit capabilities on each side that guarantee this ratio throughout the action-reaction struggle.**

In the interest of moving directly to data showing the connection between the campaign exchange ratio and the unit functional capabilities listed for each side, I'll simply quote the formula for this relationship and make its easy derivation available separately to interested readers. The formula relating the campaign exchange ratio to unit engagement parameters is:

$$E = \frac{pf_1 + (1-p)r_1}{pr_2 + (1-p)f_2}$$

This expression for the campaign exchange ratio has a straightforward interpretation. In the numerator, friendly units destroy enemy units by successful first attacks (pf_1) and counterattacks to enemy first attacks $((1-p)r_1)$. In the denominator, enemy units destroy

friendly units in successful counterattacks $(p\eta_2)$ and first attacks $((1-p)f_2)$.

Before turning to illustrative data, the following qualitative points are evident from the formula for the campaign exchange ratio:

- Since the friendly side has the stiffest challenge, it needs high probabilities of both initiating (p) and winning (f_1) first attacks (pf_1) and low probabilities (η_2) of a lethal counterattack to its first attacks.
- If friendly units have a high probability (p) of making the first attack, then the probability of an enemy first attack $(1-p)$ will be low, which simultaneously reduces the importance of friendly counterattacks (η_1) and, to a lesser extend because of its sensitive location in the denominator, the lethality of enemy first attacks (f_2).

Data that bear on these qualitative observations are shown next.

QUANTITATIVE IMPLICATIONS

For easier reading, the probabilities in the following Tables are shown in percent form. Calculated exchange ratios are multiplied by 100 to show total potential kills by 100 friendly units for comparison against the minimum campaign goal of 300 enemy units destroyed.

For the cases shown in Table 1, friendly and enemy units each have high 90-percent chances of a kill on first attack. Friendly units have 90-, 85-, 80-, and 75-percent chances of attacking first on contact and, in order to minimize the pressure on friendly units, enemy units have a low 5-percent chance of making a lethal counterattack. To assess the importance of a counterattack capability for friendly units, zero-, 10-, and 20-percent chances that friendly units will make a lethal counterattack are included.

Table 1
Campaign Exchange Ratios (x100)
90-percent chance that friendly first attacks are lethal
90-percent chance that enemy first attacks are lethal
5-percent chance that enemy counterattacks are lethal

		Chances friendlys attack first			
		90	85	80	75
Chances friendly	0	600	431	327	257
counterattacks	10	607	439	336	267
are lethal	20	615	448	345	276

The numbers shown in Table 1 for potential kills by friendly units confirm both the expected strong advantage to friendly units of a high probability of initiating a lethal attack and—given this capability—the lesser importance of friendly units having a counter-attack capability.

Indeed, if friendly chances of making the first attack decrease from 90-to slightly less than 80-percent, then the drop-off in potential kills throughout the Table—600-plus to less than 300—is striking. **Unless the probability of initiating attacks is nearly 80-percent or better, the minimum campaign goal cannot be met, even when enemy units have only a 5-percent chance of a lethal counterattack.**

Table 1 also confirms that, given high chances of friendly units making the first attack, a friendly capability for counterattack has a modest impact on campaign effectiveness. Raising the chances of a lethal counterattack by friendly units from zero- to 20-percent increases campaign effectiveness between 3-percent in the least favorable case (15 kills more than 600 in the first column) and 8-percent in the most favorable case (20 kills more than 260 in the last column). To better focus on main effects, friendly units have no capability to counterattack in subsequent Tables.

Table 2 continues the assumptions in Table 1 that friendly and enemy units each have high 90-percent chances of success in a first

attack and, to quantify the impact of a counterattack threat to friendly units, includes chances of a lethal enemy counterattack of 5-, 10-, 15-, and 20-percent.

Table 2

Campaign Exchange Ratio (x100)

90-percent chance that friend first attacks are lethal
90-percent chance that enemy first attacks are lethal

		Chances friendlys attack first			
		90	85	80	75
Chances that	5	600	431	327	257
enemy	10	450	348	277	
counterattacks	15	360	291		
are lethal	20	300			

Table 2 illustrates the seriousness of the threat of lethal counterattacks—especially if friendly units lose some initiative for first attack—and a trade-off between probabilities of a friendly first attack and an enemy counterattack.

If friendly units initiate 90-percent of the battles and win 90-percent of these, the campaign is compromised once the chances for a lethal enemy counterattack rise above 20-percent. Continuing on, if friendly units initiate 80- versus 90-percent of the battles, then the chance of a lethal enemy counterattack must be kept below 7-percent, illustrating the small room for fall-offs in friendly combat capabilities. **From the standpoint of campaign effectiveness, friendly units highly capable of initiating attacks have a small need for a counterattack capability, but a critical need to suppress, deflect, evade, or harmlessly absorb enemy counterattacks.**

As for the trade-off between probabilities in Table 2, the data show the following pattern. Starting from any position in the Table, the improvement in a campaign outcome from an increase of five percentage points in the probability of first attack can be nearly matched by reducing the chances of a lethal counterattack by the

same five percentage points. A closer analysis shows that reducing the chances of a lethal counterattack by six or seven percentage points would match any gain from raising the probability of first attack by five percentage points.

Although this indicates a small advantage from increasing the probability of first attack versus reducing the threat of lethal counterattack, the practical problems of making a small percentage increase in a large probability of first attack or or a large percentage reduction in a small probability of lethal counterattack are vastly different.

Table 3 shows campaign results in a side-by-side comparison of 90- and 75-percent chances of a lethal first attack by enemy units, given a 90-percent chance of success in first attacks by friendly units. At high probabilities of first attack by friendly units, even though first attacks by enemy units are infrequent, their lethality appears in the denominator of the campaign exchange ratio and deserves review.

Table 3
Campaign Exchange Ratios (x100)
90- and 75-percent chances (side-by-side) that enemy first attacks are lethal
90-percent chances that friendly first attacks are lethal

		Chances that friendly units attack first							
		90		85		80		75	
		90	75	90	75	90	75	90	75
Chances	5	600	675	431	494	327	379	237	300
enemy	10	450	491	348	387	277	313		257
counterattacks	15	360	386	291	319		267		
are lethal	20	300	318		241				
	25		270						

The value of a counterattack capability to friendly forces (non-existent in Table 3) tends to increase when enemy forces are less lethal in first attack. For the cases shown, however, increasing the chances of a lethal counterattack by friendly units from zero- to 20-percent raises all results in Table 3 by less than 7-percent in the best case, and the percent increases in campaign effectiveness as shown hardly at all.

As the lethality of enemy units in first attack falls from 90- to 75-percent, the gains in potential kills by friendly units (between 6- and 17-percent) are significant, especially for cases in the top half of the Table. For example, a gain of 30 potential kills is equivalent to the production of 10 friendly units and most of the gains in potential kills shown exceed 30 enemy units.

Furthermore, the tight lower bounds (80-percent or better) on the chances for a first attack by friendly units and upper bounds (20-percent or less) on the chances of lethal enemy counterattacks are both relaxed by about five percentage points by less capable enemy units. **Consequently, methods to blunt the lethality of infrequent enemy first attacks are helpful.**

Lastly, Table 4 examines the effect of less-lethal first attacks by friendly units. Side-by-side comparisons of 90- and 75-percent chances of lethal first attacks by friendly units are shown, given a lower 75-percent chances of lethal first attacks by friendly units are shown, given a lower 75-percent chance of a lethal enemy first attack. The lethality of enemy units in first attack is fixed at the lesser of the two friendly capabilities in keeping with the fact that the smaller friendly force must be generally superior in capability to the enemy force to have any chance of meeting its campaign goal.

Table 4

Campaign Exchange Ratios (x100)

90- and 75-percent chances (side-by-side) that friendly first attacks are lethal

75-percent chance that enemy first attacks are lethal

Chances that friendly units attack first

		90		85		80		75	
		90	75	90	75	90	75	90	75
Chances	5	675	563	494	411	379	316	300	250
enemy	10	491	409	387	323	313	261	257	
counterattacks	15	386	321	319	266	267			
are lethal	20	318	265	271					
	25	270							

Table 4 shows substantial reductions in campaign effectiveness should the chances for lethal first attacks by friendly units fall from 90- to 75- percent. For example, even if the probability of initiating first attacks is 90-percent, the less-lethal friendly units cannot meet their campaign goal when the enemy has a 17-percent chance of a lethal counterattack, but the more capable friendly force easily can. The same is true whatever the chances that friendly units make the first attack.

If their lethality in first attack falls from 90- to 75-percent, friendly units must increase their chances for initiating attacks or reduce the chance of a lethal enemy counterattack by less than five percentage points to maintain a three-to-one campaign exchange ratio. A failure to follow up high probabilities of first attack with a high probability of a kill risks defeat when enemy units have moderate chances for a lethal counterattack.

BOTTOM LINE

If a friendly force is numerically overmatched three-to-one or worse in a search-and-destroy type operation, then it must initiate and convert first attacks with probabilities both better than 80-percent and, at the same time, hold the risk of a lethal

enemy counterattack below 20-percent in the most favorable case and perhaps 10-percent in modestly unfavorable cases. These bounds can be relaxed by some five percentage points if enemy lethality in first attack falls from 90-to 75-percent or tightened by the same five percentage points if the lethality of friendly units in first attack falls from 90- to 75-percent.

Whether it is feasible in practice to achieve winning combinations of such tightly constrained and demanding unit functional capabilities for combat certainly depends upon the kind of search-and-destroy operation and the comparative technical and operational strengths of each side. However, if the opposing sides are roughly comparable in capability, then the prospects for victory by the smaller force most likely are dim.

In search-and-destroy operations against a responsive enemy, it is asking a lot for quality to overcome a serious quantitative inferiority.

Interested readers can have a short development of the formula for the campaign exchange ratio by contacting me at hank.young@verizon.net.

CAMPAIGN GOALS AND UNIT CAPABILITIES

Formula for the Campaign Exchange Ratio

The text describes the combat capabilities of each friendly unit by the probabilities of: (1) attacking first upon contact, p; (2) destroying the enemy unit on first attack, f_1; and, (3) reacting to an enemy first attack with a lethal counterattack, r_1. With the same interpretations, the independent probabilities 1 - p, f_2, and r_2 characterize the combat capabilities of enemy units.

Depending upon which side attacks first, the independent probabilities for clean wins, clean losses, mutual losses, and a possible no-decision, are the following (overbars denote complementary probabilities, i.e. $\bar{a} = 1 - a$):

	First Attack	
	Friendly	Enemy
clean win	$w_1 = pf_1\bar{r}_1$	$w_2 = \bar{p}f_2\bar{r}_1$
clean loss	$l_1 = p\bar{f}_1r_2$	$l_2 = \bar{p}\bar{f}_2r_1$
mutual loss	$a_1 = pf_1r_2$	$a_2 = \bar{p}f_2r_1$
no decision	$n_1 = p\bar{f}_1\bar{r}_2$	$n_2 = \bar{p}\bar{f}_2\bar{r}_1$

From the standpoint of the friendly side, the total probability of a clean win on contact is the sum of a clean win on first attack and an enemy clean loss on its first attack or $w_1 + l_2$. Similarly, the total probability of a friendly clean loss is the sum of a clean loss on a first attack and an enemy clean win on its first attack or, $l_1 + w_2$. The total probability of a mutual loss on contact is the sum of mutual losses, $a_1 + a_2$, and the total probability of a no-decision on contact is the sum of no decisions, $n_1 + n_2$ As seen by the friendly side, these probabilities are:

$w = w_1 + l_2 = pf_1\bar{r}_2 + \bar{p}\bar{f}_2r_1$

$l = l_1 + w_2 = p\bar{f}_1r_2 + \bar{p}f_2\bar{r}_1$

$a = a_1 + a_2 = pf_1r_2 + \bar{p}f_2r_1$

$n = n_1 + n_2 = p\bar{f}_1\bar{r}_2 + \bar{p}\bar{f}_2\bar{r}_1$

By definition, the campaign exchange ration, E, is the fraction of enemy units destroyed, w + a, per fraction of friendly units lost, l + a, in all encounters, or $E = \frac{w+a}{l+a}$

Adding the expression for w and a—taking into account that $pf_1\bar{r}_2 + pf_1r_2 = pf_1$ and $\bar{p}\bar{f}_2r_1 + \bar{p}f_2r_1\bar{p}r_1$ because the uncommon factors in two products sum to one—$w + a = pf_1 + \bar{p}r_1$. Adding the expressions for l and a (making the same kinds of simplifications as before), $l + a = pr_2 + \bar{p}f_2$. Finally, by substitution,

$E = \frac{pf_1 + \bar{p}r_1}{pr_2 + \bar{p}f_2}$ as quoted in the article.■

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THE CASE FOR SUBMARINE CSD[1] EXPENDABLES

by CAPT JAMES H. PATTON, USN(Ret)

Captain Jim Patton is President of Submarine Tactics & Technology of North Stonington, CT. He is a frequent contributor to these pages.

Background

Submarine *Communications from Speed and Depth* remains an urgent operational need with no clear technical solution. Several things have become clear, however, which promise to enable some degree of relief from the problem. First and most importantly, it has been generally accepted, at least in the short to mid-term, that there is no *silver bullet* solution, and that operational requirements must be met with a *family* of partial solutions. Secondly, meaningful analysis of the tactical issues involved highlight the fact that comms at operationally meaningful speeds and non-cavitating depths are far more important than comms at deep depths just for deep depths sake. Thirdly, regardless of foreseeable enabling technical developments, submarines will remain *disadvantaged users* of FORCEnet assets compared to a destroyer with more than 150 dry antennas well above the air-water interface. As such, there will continue to be submarine-unique techniques and procedures for operational connectivity to include continued employment of some level of *broadcast* means of Command and Control (C^2) and other *passive* (listen only) methods.

Discussion

A key member of the family of CSD partial solutions is and will be *expendable* devices. Not a new concept by any means, the venerable Submarine-Launched One-Way Transmission (SLOT) buoy was used throughout the Cold War to broadcast tape-recorded messages of up to 5 minute duration to nearby Maritime Patrol Aircraft (MPA) on pre-designated VHF sonobuoy channels. The device was launched from the ubiquitous 3-inch signal ejector found on all U.S. submarines. Some later variants of this same concept used UHF to transmit directly to communications satellites.

[1]CSD—Comms at Speed and Depth.

With the development of affordable fiber optic links, what has become feasible is a *tethered* expendable of the same form and fit as a SLOT buoy, but which would enable two-way connectivity for dozens of minutes from hundreds of feet depth and operational meaningful speeds. A very distinct option is to exploit the mid-earth orbit of the *Iridium* constellation to conduct CSD with far less radiated power, easing the constraints of stored energy in the expendable device. Also, the buoy can be made capable of transmitting very large pre-loaded data files *after* the two-way CSD period has been completed, the tether severed, and the submarine has gone on its way. Any such two-way buoy could, of course, be used in a one-way mode in a *launch and leave* mode, much as was the legacy SLOT buoy. This becomes particularly attractive from an operational flexibility perspective in lieu of building a separate one-way variant if, as is projected, the cost of the spool with nearly 2 miles of fiber optic tether can be kept to a few hundred dollars.

The tactical advantages of such an expendable device need no great justification to submariners, but might not be as apparent to those who have not lived with the time and distance penalties or lost contact probabilities of coming to periscope depth while in transit or otherwise profitably employed. Also, with increased emphasis towards operating in often crowded littorals, a very real ships safety issue can be mitigated by providing other options to *coming up* in high contact density situations. Even given this capability in the near to mid-term, there will be significant challenges concerning the *education* of non-submariners as to the remaining limitations of submarine CSD. The initially planned loadout in the order of 100 such devices per ship sounds like a large number to submariners, the aggregate *time-bandwidth product* they represent is but an infinitesimal fraction of that routinely employed by other units of the joint forces who have a demonstrated ability to rapidly fill any communications *pipe* provided. The seemingly mundane and antiquated concept of *circuit discipline* will remain a critical aspect of operating with submarines.

Although the principle thrust of this article is to address expendables as they apply towards partial solutions to submarine CSD, once the advantage of using the 3 inch signal ejector as a convenient access to the ocean environment available on all U.S.

submarines, any number of other *payloads* for expendable devices come to mind. For example, a proof of concept experiment recently conducted involved connecting very affordable photonic sensors to inboard image stabilizing electronics to obtain a 360° panoramic view of the surrounding seascape. In calm waters this view was out to several miles, and (non-intuitively) in high sea states much further, since unlike periscopes which see only the front of the next wave coming or the inside of the one that's already there, the lightweight buoy-like object rides the top of each crest, giving frequent views of the horizon itself. Two employments of such an expendable come to mind—one for distant looks in high sea states as mentioned, and another as a safety check immediately before coming up—especially in an emergency or prior to a routine test of the Emergency Blow System.

There is another intriguing application. The Automatic Identification System (AIS) has recently been mandated for all commercial ships over 300 tons. This system constantly broadcasts a given ship's dynamics, such as course, speed and geographic location, and also static information such as port of departure, destination and cargo summary. Imagine the tactical advantage to a submarine for ship's safety or for Intelligence, Surveillance and Reconnaissance (ISR) to be able to passively acquire that information for all ships within 10s of miles while at speed and depth simply by launching an expendable device. Similar tethered expendable devices fitted with appropriate and increasingly inexpensive sensors could monitor other's radar or communications emissions or sample of airborne indicators or precursors for chemical, biologic or radiological materials.

In all, the carrying of meaningful numbers of attractive variants of 3-inch expendables greatly exceeds any expected storage space available—especially since the numbers needed of each of the different variants would not be well known prior to sailing. What this combination of facts leads to is a concept of Submarine Mission Reconfigurable Expendables (SSXMR), where any number of various *payloads* can be mated, in real time aboard the deployed boat, to a *common* afterbody containing all of the *common denominator* hardware and standardized interfaces. This *open architecture* approach would stimulate future developments of even more useful

payloads and provide a convenient platform upon which to quickly field a device in response to an emergent requirement.

Conclusions

To fully exploit their intrinsic qualities of stealth, mobility, firepower and endurance, unique among combat systems in the aggregate, the modern nuclear submarine needs improved connectivity at operationally meaningful non-cavitating speeds while significantly away from periscope depth. No single technical solution is presently apparent to provide this improved connectivity, but several means exist to provide *partial* solutions. Predominant among these, and having the desirable attributes of being available in the short term and applicable to *all* U.S. submarines, are appropriately configured and fiber optic tethered expendables launched from universally existing 3-inch signal ejectors. In addition, using similar technologies, several other tactically desirable devices could be fabricated—even to the point of considering various payload modules that mate to a common afterbody to simplify stowage and logistics and facilitate further developments.■

AMERICAN SUBMARINERS OCCUPY YOKOSUKA TWO DAYS PRIOR TO THE FORMAL JAPANESE SURRENDER SEPT. 2, 1945

by RADM JOE VASEY

"After we whip the Japanese, we will get together for drinks at the Submarine Officers Club in Yokosuka."
Message to all Commanding Officers in early 1943 from Vice Admiral Charles Lockwood USN, Commander Submarines Pacific

Fast forward to:
On 14 August 1945(East Longitude date) Radio Tokyo announced to the world that Japanese Emperor Hirohito had agreed to the terms of a Cease Fire dictated by the Allies, and the next day General Douglas MacArthur, who had just been appointed Supreme Commander of Allied Powers by President Truman, directed the Japanese government by radio to order "immediate cessation of hostilities" and to send a competent representative by air to Manila to receive instructions for the formal surrender and the reception of occupation forces.

I was a PCO in Guam at the time of the broadcast looking over the side of the submarine tender USS PROTEUS at the nest of submarines below wondering which one I would soon be in command of. Sailors and repair crews topside were as busy as bees getting the subs ready for war patrols. When the news was announced over the loudspeakers all work came to a screeching halt and everyone stood around as if in a daze. But there were no celebrations, sirens or shouting and within twenty minutes all was normal again. At that stage of the war, we had already taken it for granted that the enemy was on his knees and victory was near. Thoughts of family, friends and home after a long, hard fought war were on everyone's mind, while on the home front, President Truman declared a two day holiday of celebration for all Americans.

Admiral "Bull" Halsey's U.S. Third Fleet was already approaching Tokyo Bay, invasion forces were assembling at Okinawa and

more troops and ships were enroute across the Pacific. Our warplanes clouded the skies between the Marianas and Japan, and a ring of American submarines kept a tight noose around the Japanese home islands.

Admiral Nimitz invited ComSubPac, Vice Admiral Charles Lockwood, to attend the formal Japanese surrender ceremonies on the MISSOURI and also gave permission for twelve submarines and the PROTEUS to be present in Tokyo Bay.

Squadron Commander Lew Parks was immediately ordered to get underway aboard PROTEUS and with submarine relief crews to land and take possession of the Yokosuka Naval Base. Then to *demilitarize* the scores of mini-submarines and suicide torpedo boats known to be on the base or nearby in Tokyo Bay. .

Those of us in the pool of PCO's waiting in Guam for the next opportunity to take command of a submarine debated the attraction of going to Tokyo Bay and being part of an historic occasion versus remaining in Guam for a long cherished submarine command. I had the most vested interest in the latter being finally at the top of the list after a long wait in Guam where we had been kept busy as harbor pilots conning large troop transports and former ocean liners in and out of port.

But our discussion was preempted by orders to board PROTEUS for transportation to Tokyo Bay and get ready to lead our submarine relief crews ashore in the hoped for peaceful occupation of Yokosuka Naval Base. My PCO comrades in this venture included Lieutenant Commanders Paul Schratz, Fred Tucker, Joe McDowell and T.C. Williamson.

PROTEUS joined with the Third Fleet south of Tokyo Bay on 21 August and on 31 August was ordered to an offshore mooring in Yokohama Bay, within sight of the MISSOURI. It was an awesome sight to see the display of naval power in the bay, 258 warships of all types from battleships and flattops to small amphibious ships representing the allied nations which had been at war with Japan. Our twelve submarines were kept at sea until their symbolic entry to the Bay early in the morning of September 2nd, the day of the official Japanese surrender aboard USS MISSOURI. Most of the aircraft carriers remained outside in order to launch planes for a massive fly-over at the appropriate moment of *V-J Day*.

On August 31, the US Army had sent a team of explosive and demolition experts aboard PROTEUS to brief those of us scheduled to land at and secure the Yokosuka Naval Base. The briefings included precautions to observe as we stepped ashore and searched the buildings, procedures to defuse and remove detonators from the warheads of midget subs and suicide craft and safety precautions to avoid catastrophes. After the two hour, rapid fire briefing, the bottom line of the message conveyed by our Army friends was to be extremely cautious about touching anything because, "it may be booby trapped".

Late that afternoon, two days before the official Japanese surrender, Commodore Lew Parks who was over-all commander of the landing force of 250 or so American submariners gave the order to execute and sailed off in the lead motor launch with a small staff and headed for Yokosuka, ten miles away. The rest of us in the landing force followed subsequently in motor launches, in two groups led by submarine division commanders Bernard F. McMahon and Rob Roy MacGregor. Each of us PCOs with our assigned crews were ordered as first priority to search and neutralize our designated sectors of the base..

We were packed tightly in the motor launches for the ten mile trip to the base about eight in the evening—my crew and I were in the echelon under command of MacGregor. The PROTEUS repair crew had jury-rigged mounts for machine guns on the bow of each launch. The sailors were armed with Springfield rifles and we officers with 45s.

Soaked to the skin from the cold rain and waves breaking over the bow we were over-joyed at finally reaching our destination, although admittedly with much trepidation as we contemplated the next move. Our launch landed in the darkness at the end of Drydock Six. I don't recall which brave soul was first to clamber up and onto the dock. There was a certain distinction trying to be the first ashore, but as we drew closer to the dock the warnings from our Army friends prevailed over personal thoughts of bravado and we wondered what reception was awaiting us.

Intelligence reports stated the Japanese military did not fully support the terms of surrender. Admiral Nimitz had earlier warned "beware of treachery or last moment attacks by enemy forces or

individuals". More than 5000 Kamikaze diehards remained in Japan ready to do their duty.

But we were fortunate as we leapt ashore that evening and fanned across the base to search assigned sectors. Using portable lights we looked through office buildings, barracks, storage depots and machine shops and discovered nary a soul—it was like being in a ghost town. In one huge room for designers and draftsmen, it was eerie to see engineering drawings, instruments and personal belongings neatly atop desks and drafting tables as at the end of a routine work day with personnel expecting to return in the morning. General MacArthur had earlier ordered all military forces and civilians to evacuate the coastal areas for three leagues inland. Fortunately the Japanese had obeyed like robots.

Nonetheless, throughout the first night on the base, rifle shots were heard intermittently as our sailors fired at suspicious shadows and mysterious noises. Several of us always converged on the scene with weapons at the ready expecting the worst. Large rats scurrying around in the deserted buildings usually were the culprits and we were happy that our submarine sailors were such skilled marksmen. Finally, at about 5 a.m., assured that the base was indeed deserted, we stood down some of our men for a rest period, all sleeping on tables, benches and desks to escape the wild life underneath.

But no one rested for long. Our crews were needed to inspect and demilitarize the myriad of mini-subs and KAITEN (suicide craft) on the base. Fortunately, all of the KAITEN and most of the mini-subs had been hauled out of water and onto skids near the seawall. Bows had been completely chopped off the boats as ordered by General MacArthur, and the Japanese military had been directed to remove or inactivate the detonators in the mini-subs.

The hatches leading into the subs were very small, so rather than enter traditionally and risk stepping on a booby trap, I opted on the first inspection to go in head first with some of the guys holding onto my legs. With flashlight in hand, all I could see was a maze of wires, pipes, gauges and dials making it impossible to even move without bumping into something. I silently cursed the Army explosive experts and proceeded with the task at hand. It was challenging and hazardous work for our submarine sailors and I have long felt they should have been accorded more recognition for an important job

well done.

To my recollection, only a couple of occasions were experienced where the Japanese had not fully complied with orders. Most notable was a large underground ammunition storage depot, loaded with bombs,warheads and detonators stored in neat rows uncomfortably close together. It was the size of a basketball court. Only hours after the entrance had been initially discovered in a wooded area, one of my sailors spotted and reported what appeared to be a telephone line hidden in the bushes. He was startled to discover at the end of the cable, a hand operated, plunger detonator, *at the ready*.

Subsequently it was discovered that the base was honeycombed with underground offices and repair shops with a network of tunnels that led to senior officers quarters. Years later when my family and I were moving into quarters on Halsey Road, the spouse of a former occupant informed us of a trap door in the living room from which the ghost of the Japanese Admiral in command who had committed Hari-kari would periodically rise from the depths and converse with her. During the Vaseys tenure in the house, we never had this experience, probably because our German Shepherd preferred to sleep on the living room rug right over the trap door. Nevertheless, for many years before and after *the ghost of Halsey Road* was a living legend and became a central theme of the novel *THE CROWS OF EDWINA HILL*.

The night of September 1st, I was notified by a sentry that lights were observed in a deserted building we had already searched the evening before. Quickly gathering some of my troops together and with two well armed Marines, we surrounded the building and entered cautiously, soon finding the lighted room. Voices were heard within. With weapons drawn, the Marines kicked in the door and we rushed in, embarrassed to find four Japanese submarine officers playing cards. With the four rising and stiffly bowing from the waist repeatedly until I stopped them, one identified himself in fractured English and said, "We have been waiting a long time to turn over command of our submarines. Where have you been?"

The building was the Japanese submarine officers "O" Club. It also included administrative offices and a suite for the base commandant. An attractive adjoining room fitted with traditional tatami mats and head rests was for the commandants private geisha, or so we

opined. Later in the evening I informed PCOs Paul Schratz and Joe McDowell of this find and all agreed it was much more appealing than sleeping on table tops as during the night before. Turning in sometime after midnight we soon became appealing morsels for body lice, bed bugs and other vermin; that is except for Joe even though he was sleeping between Paul and me. When the tender PROTEUS moored alongside a pier early in the morning we could hardly wait to rush up the gangway to shed our clothes and throw them over the side while corpsmen hurriedly rigged a nozzle spray to fumigate and de-louse the two of us from head to toe.

During the formal surrender ceremonies on board MISSOURI that morning, most of us ashore were still crawling through midget submarines. But at 0925, as the ceremonies were closing and the sun broke through, we all stood in pride as over a thousand carrier aircraft and B-29 bombers swept low across Tokyo Bay and over MISSOURI in a thunderous roar—a message of courage, skill, determination and steeled will to any Japanese leaders who thought their government made a mistake in its capitulation.

Later, when we received word Admiral Lockwood would be on the base to greet us that afternoon, our priorities shifted and we gathered in front of our newly christened "O" Club to give him a rousing cheer with the famous *V—for Victory* salute when he arrived, to let him know that his 1943 promise to submariners to have a drink together at the sub officers club in Yokosuka when "we whip the Japanese"was now a reality. One of the truly great military leaders of the Pacific war, he was our hero. Then we all bowed our heads in a minute of silence and a prayer in remembrance of shipmates on eternal patrol.

The party that followed lasted well into the evening and was something that even the British Royal Navy would envy. Glasses were raised to toast our Commander in Chief, President Harry Truman followed by toasts to other allied heads of state, to several American and allied military leaders, to Admiral Lockwood ,loved ones at home, and to all comrades in arms.

A photo of the submariners gathered at Yokosuka in front of the "O" Club is displayed in the Clean Sweep Bar of Lockwood Hall at Pearl Harbor, as well as in the Bowfin Submarine Museum. Admiral Lockwood is center of the bottom row surrounded by CO's of subs

then in Tokyo Bay, squadron commanders, CO's who had hitched rides from other locations including John S. McCain my former skipper on USS GUNNEL, and officers of the crews who landed at Yokosuka two days earlier.

Conspicuous by their absence were two prominent submarine officers whose names shall remain anonymous. They had opted instead to *borrow* an armed jeep belonging to the Military Police and drive the 30 miles to Yokohama so they might lay claim to being the first yanks spending an evening in a Geisha House. A successful venture they bragged about in the post-war years

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THE I - 400 CLASS OF JAPANESE SUBMARINES

On August 28th, three of the giant I class of Japanese submarines were intercepted and surrendered East of Honshu and later brought into the bay and alongside PROTEUS on the 31st. The I –400 had struck her colors to Commander Hiram Cassedey former colorful skipper of the TIGRONE who became her first prize crew captain. He didn't last long as I - 400's skipper, running afoul of Admiral Halsey for disregarding his order about taking swords as souvenirs. Incidentally the Japanese squadron commander who was aboard the I – 400 went to the bridge and shot himself rather than surrender.

I was ordered to accompany our squadron doctor and his chief pharmacist mate with two armed Marines and assist in assessing the living conditions in the I – 400 and the physical status of the crew. The skipper of the boat in response to my query said there were a total of 180 in his crew, but as we went through the compartments we tallied 212. By our standards, creature comforts were virtually non-existent and very few water spigots were available for personal use and meal preparation. The *heads* were just holes in the decks above sanitary tanks....we did not linger long in these areas due to the stench. Sailors were packed like sardines in multi-tiered bunks and many eating supper lying in their bunks and disposing of leftovers onto the deck which was already filthy; Supernumerary crewmen simply slept on the decks. Most shocking were the numbers of large rats and hordes of cockroaches nonchalantly scurrying about as if they were members of the ship's company. That evening the I – 400 crew were ordered to sleep topside while the

boat was fumigated, and the next morning eleven gunny sacks full of carcasses were carted away.

In spite of these deplorable conditions, the 18-19 year old sailors seemed in remarkably good health and spirits, lean and trim, attired only in loin cloths. They displayed no animosity toward us, only indifference.

The I – 400 was a remarkable submarine way ahead of her time, with a cruising range of 37,500 miles, snorkel, radar detectors and a 115 foot hanger opening onto an 85 foot long catapult for the three aircraft stowed aboard. Since early in the year the four I class submarines had been in training for bomb and torpedo strike against the Panama Canal's vital Gatun Locks. But by June, three thousand American warships and transports were already in the Western Pacific and the mission of these submarines was changed to launch suicide torpedo attack by KAITEN submarines in coordination with air strikes against American forces.

(Note: Later in 1945, the I – 400 was brought to Pearl Harbor with an American crew under command of Joe McDowell. The Exec/Chief Engineer was Lieutenant Thomas O. Paine who, subsequently, as a prominent scientist, headed NASA during the Moon landings, and later was President of Northrop Corp. and Chairman of the Board of my international relations institute Pacific Forum. Tom Paine was proud of his submarine service in WW2. His personal SUBMARINE WARFARE LIBRARY on American, allied and axis powers submarines in WW2 was undoubtedly the best collection of its kind in the world. It was later donated to the US Naval Academy).■

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TRACKING THE CHINESE DRAGON—THE ORIGIN AND DEVELOPMENT OF CHINA'S SUBMARINE FORCE, 1953-1988

David E. Faherty III
Midshipman, United States Navy

Adviser: Maochun Yu
Associate Professor, United States Naval Academy

13 December 2005
History Honor's Thesis

Ensign David E. Faherty III graduated number 100 from the Naval Academy with the Class of 2006. At the Academy, he was an Honor's History Major and a Bowman Scholar. After completing a Masters Degree at Naval Post Graduate School in Joint C4I, he is headed to Nuclear Power School, and then on to the Submarine Service.

Beach Award Background

Since 2001, the Naval Historical Foundation has presented an annual prize to the U.S. Naval Academy midshipman demonstrating outstanding scholarship in the field of naval history. The 2002 prize was presented by author, submariner and long-time Foundation Board member Captain Edward L. Beach, Jr., USN (Ret). With the passing of Captain Beach in December of that year, the Foundation received permission from the Naval Academy Superintendent to rename the annual prize for Captain Beach. The Captain Edward L. Beach Naval History Prize, jointly administered with the U.S. Naval Institute (who enjoyed a long and productive relationship with authors Captain Beach and his father and whose offices are in Beach Hall) consists of a plaque, life membership in the Foundation, Foundation and Naval Institute Press naval history publications and a book by Ned Beach presented in his name by his wife Ingrid Beach.

When the Chinese Communists had successfully driven the Chinese Nationalist forces off the mainland to Taiwan, they faced numerous challenges as they attempted to establish authority over the new country. One of the most serious questions was the issue of sea power. During these formative years, the People's Republic of China (PRC) developed a naval strategy that integrated modern advances with the ideology of the *People's War*. The end result was a navy that was peculiarly Chinese, containing both elements of Soviet naval theory and traditional Chinese teachings. The political forces that drove the creation of the Chinese Navy concentrated on the deployment of submarines. Within only three decades, this Submarine Force would be composed of more than one hundred submarines. While the country has steadily increased the potential and quality of this force, China has continually reaffirmed its belief in sub-surface naval power over the past five decades. This study seeks to trace the origin of China's Submarine Force and analyze the major impetuses for the landmark developments of this force from the earlier Soviet-inspired prototype to China's acquisition of subsurface nuclear strategic deterrence.

THE SOVIET GENESIS

In the early years of the PRC, despite the need for a navy, it took several years for the Communists to consolidate the power necessary to develop one. By 1953, the leaders grasped the importance of defending such a large coast line and felt ready to address the issue of maritime strategy. At the time, the new government had three options. First, in an effort to maintain ideological continuity, the PRC could have chosen to establish a People's fleet by arming junks with mines and small guns. The second option was for China to follow the teachings of Mahan and create a large surface fleet centered on the aircraft carrier. Finally, China could have chosen to follow the example of Russia and adopt the Young School of maritime strategy. In this school of naval thinking, the submarine assumed the role of capital ship, supported by land based aircraft and small patrol boats. Using inherently offensive weapons, the Young School espoused the virtues of an active defense.

The first option had some realistic appeal to the Chinese Communist Party (CCP) high command. As the Communists drove

the Nationalists from the mainland, there were times when the use of maritime forces became necessary. From river crossings to island invasions, the People's Liberation Army (PLA) used small naval vessels in very ingenious ways. There were accounts of the Communists welding hundreds of barrels together, forming giant rafts that they disguised as islands. They would then make hardened shelters for artillery pieces and mortars. These vessels were designed to aid invasion forces transported on junks.[1] However, creativity could not overcome professionalism, as the Communist Chinese frequently suffered attacks from Nationalists forces based in Taiwan. Thus, from 1948 until 1954, the Chinese Communist Navy underwent a period of building maritime force from scratch. During this time, Communist forces had acquired through surrender or capture 57,986 gross tones of former Nationalist vessels. Initially, this fleet of mostly outdated western vessels[2] formed the core of China's fleet.

In addition, there were innumerable junks available along China's coast. Forming a navy out of these boats would have created a maritime force most similar to the People's Liberation Army, where quantity of personnel and simplicity of weapons were paramount. Indeed, large numbers of motor junks armed with only a few mines could effectively defend China's coast; its ground forces could prepare to "lure the enemy deep." As late as 1956, the US Intelligence cited China's strongest defensive weapon to be the junk's nearly unlimited mining capacity.[3]

These vessels could be employed offensively as well. As the Communists advanced against Hainan in southern China, indigenous vessels made up the bulk of the invasion forces. Armed with rockets and artillery, and carrying boarders, the PLA managed to drive the Nationalists out of their island strongholds and secure access to the sea.[4] Though not entirely successful, junks contributed to this effort. In the end, the Communist Chinese organized their coastal fishing vessels to stop peasants from fleeing the country. Stringent rules were put in place that prevented fishermen from exodus. They were required to fish in groups, and family members were forced to stay on shore as hostages.[5]

Although junks played a vital role in the early PLA successes, controlling junks was a component of societal integration that was occurring throughout China, including the historically independent

coastal regions. Junks were not to form the core of the PRC's new navy. Although indigenous vessels satisfied some of China's defensive goals, they were not adequate. They neither conferred the prestige of large warships, nor possessed the capabilities of modern platforms.

The second option, i.e., the Mahanian approach, would pose serious challenges to the CCP high command. In the nineteenth century, Alfred Thayer Mahan preached the importance of sea power. He argued that the capital ship established control of the sea, which was a prerequisite for establishing an empire. Battleships had been the capital ships in Mahan's time. After the Second World War, it became clear that the aircraft carrier superseded the battleship. These large flotillas had proven to be effective weapons in the previous great war. Japan's explosive empire had been carried upon such vessels. A large surface force centered on aircraft carriers was the age's mark of an influential nation.

However, to the CCP, this method of securing maritime dominance was inadequate for several reasons. To the leaders of the PRC, Mahanian capital ships represented imperialism. Naval power was seen as inherently bourgeois. On the propaganda front, sailors were said to protect the sinews of capitalism and trade, while the proletariat struggled on land to achieve real improvements in society. It was ideologically incorrect for the PRC to emulate the implements of an ideology that it had rejected. In reality, China lacked the resources and knowledge necessary to build such a fleet. The cost of procuring, maintaining, and deploying a fleet of surface vessels was prohibitively expensive for a country recovering from decades of war. Finally, China's leaders did not want to play a game of catch-up with western powers. It was argued that imitation would not result in anything but second rate success. Instead, the PLA Navy (PLAN) would build a navy that could provide for the nation's defense and enhance its reputation. At the same time, China would keep an eye to the future, ready to incorporate any potential advances in naval technology.

This leads to the third option available to the CCP. The solution was related to the Young School of maritime strategy. Rooted in partisan warfare, the Young School was developed in Russia after the Bolshevik Revolution. The parallels to China are quite apparent:

emerging from revolution, the Soviet Russia and Communist China, both large, land oriented countries, sought a new method by which to defend their sea borders. However, the priorities of these inexperienced governments were focused on their land defense. With this interior orientation, the Young School subordinated the navy to the army. Army control of Naval Forces was especially important in China, where most of the capable mariners came from the Nationalist forces and required *reeducation* after surrendering former Nationalist vessels. Very few of China's most experienced naval officers possessed enough political clout to influence the shape of the new navy. China's naval forces and strategies were conceived by men who had displayed proficiency in fighting on land.

Nevertheless, a PRC navy had to be built and building a Young style navy was by far a cheaper alternative to a great Mahanian fleet. Since it required less manpower, infrastructure, and material, strategists preferred the stealthy submarine to the expensive aircraft carrier as the fleet's primary offensive strike weapon. The navy was tasked with developing an active defense in contrast to Mahan's *command of the sea* strategy.[6] The tactics that submarines were to employ while defending against an invader more closely resemble those used by the People's Liberation Army in its defeat of the Nationalists on land. Moreover, army-generated tactics such as feints, surprises, and degrees of mobility were dramatically enhanced by naval operations prosecuted underwater.

Yet realistically speaking, with all of the advantages that can be attributed to the Young school, it must be made clear that this was really the only viable option for China to advance beyond its fleet of junks and battle-weary foreign vessels. At this formative time, China was completely reliant on Russian aid and expertise. The Soviets provided everything necessary to copy their navy. In addition to submarines, the Young School also relied on a combination of small surface vessels, torpedo boats, and land based aircraft.[7] The USSR supplied all of these vital components, and nearly everything that it possessed. Unable to build aircraft carriers and other large surface vessels, the bounds of China's navy were set back in Russia. For this reason, China could ask only for more of a certain type of vessel and not for a different variety. There were no options available had China desired some other form of naval armament. Thus, China

applied its most abundant resource to Russia's generous gift, with manpower voraciously devouring everything that the Soviets offered. Politicians beckoned for more aid as technicians requested exposure to more knowledge.

In this spirit of *eternal friendship*, the USSR transported supplies and material over Siberia's railways. This same conduit carried forth from Russia prefabricated pieces of ships and submarines, and as well, the Soviet technicians who then assembled them. These ships replaced the captured vessels of the Nationalists. However, most of these imported vessels were of pre-World War II designs.[8]

As China was acquiring these new weapons, Mao gave the Chinese Navy three strategic goals on December 4th, 1953. They were: to eliminate Nationalist naval interference and thereby ensure maritime safety in navigation and transport, to participate in the recovery of Taiwan at an appropriate time, and to oppose imperialist aggression from the sea.[9] The goals expressed by Mao Zedong energized programs that strengthened China's coastal defenses, went about acquiring modern weaponry, and formed the organizational structure of the PLA Navy. Providing the impetus for the creation of a navy, Mao wanted the PLAN to conform to the image of the army with guiding principles of the People's War such as *protracted-warfare* and *concentration of forces*. Transferring these ideas to the sea for the sake of ideological purity resulted in a navy different from any other. Although China received Soviet tools, it would not employ them in the same manner.

In July of 1953, the PRC received its first submarine from the USSR. By the fall of 1954, Russia had sent one "M" class short-range submarine and two "S-1" class long-range submarines. The single "M" class submarine was permanently stationed at the Chinese naval base at Tsingtao. It only occasionally got underway in the harbor. US intelligence believed that it was used as training and familiarization platform. The other two vessels, both long range "S-1" class submarines, were believed to be fully operational and had been observed underway outside the harbor at Tsingtao. All three vessels flew the Chinese Communist naval ensign, and thus were in the possession of the PLAN.[10] It was with these first vessels that China acquired a taste for submarines.

Soviet assistance, which began as the outright transfer of

warships, included technical advisors that directed the Chinese on warship construction and the expansion of shipyards. Indeed, the aid that the USSR provided was unprecedented. During the late 1950's, Russia for the first time allowed Soviet designed warships to be built outside of the country. In 1956, the year that China first built its own submarine, the PLAN possessed thirteen submarines, four long-range, four medium-range, four costal, and one non-operational training submarine.[11] In obedience to Mao's doctrines of *concentration of forces* and *mobility of forces*, these submarines were grouped at three strategic locations, Tsingtao, Shanghai, and the Choushan Islands.[12]

In a short period of time, China began to realize its first goal. These few vessels were to provide for the defense of mainland China. Smaller gunboats and surface ships dealt with the Taiwanese menace, but submarines were aligned against the United States, the leading *capitalist* nation at the time, thus developing a pattern of naval strategy that would continue for decades.

The number of Soviet advisors present in China during this period, over five hundred altogether, gives testament to the fundamental influence of the USSR. The Soviet Naval Advisory provided naval experience, methods, and technical skills to the Chinese. They imparted their expert knowledge to every major subordinate command and installation. Before the Chinese gained any practical experience, every ship in the PLAN was tutored by a representative of the Soviet Union.[13] These advisors laid the strong foundation upon which China's navy was built. Chinese engineers assimilated their expertise and imitated their techniques.

It was obvious that China valued its submarines over its surface ships. They learned quickly, for the first home built submarine ushered in the arrival of many more within a short period of time. By the end of 1956, the Chinese had constructed four submarines, with four or five additional submarines on the way.[14] American intelligence identified these submarines to be of the long-range *Whisky* (W) class. Secrecy has always been an essential component of Chinese military doctrine. Such a high priority was given to the construction of *W* class submarines that they were produced in the heavily guarded Kiangnan Shipyard in Shanghai, with construction shielded by tall bamboo screens. These preventative measures made

it difficult for foreign ships to observe building activity associated with submarines. In contrast, the production of the *Riga* class surface ship took place openly in the Hutung Shipyard, where it was easily photographed by passing merchant traffic. These observations reveal the relative importance of the two types of vessels. US intelligence counted sightings of submarines fitting out or in sea trials in order to determine how many submarines the PRC was producing. The information gathered led American analysts to believe that it took China approximately twenty months from the laying of the keel to the delivery of an operational unit.[15]

China's preponderant emphasis on naval, particularly submarine, development created swift international response, especially from the United States. Many US intelligence reports were created during the 1950's and early 60's that focused on China and its early naval development. These reports paid a great deal of attention to developments within this new communist nation. Indeed, this interest in Chinese affairs demonstrated American concern. In less than a decade, China was to make advances that harkened of greater things to come. There was little that the United States could do, but to watch as Chinese submarines quickly grew in number and quality. Under the guidance of Soviet advisors, the People's Republic of China had emerged as a sizeable naval power in Asia by 1958. In only a few short years, the Chinese had learned enough to construct warships of their own.

However, the material and technological component of the PLAN was not the exclusive area of improvement. Impressive changes had taken place that advanced the skills and competency of Chinese sailors. In 1955, the PRC instituted a new system of conscription. The reforms standardized ranks, enhanced the prestige of the officer corps, and delineated terms of service. New laws allowed naval officers to wear insignia for the first time. For enlisted personnel in the navy, the term of service was set at five years. This was the longest term set for enlisted men of all branches of the military, presumably because of the more specialized training that sailors required.[16] The establishment of academies to train a cadre of officers had greatly increased the efficiency of the navy in only a few years.[17]

Imbued with *tremendous energy, activity, and a sense of purpose*,

Chinese workers and technicians had quickly overcome tremendous hindrances.[18] It was this same high morale that forced the analysts of a hypothetical clash between the naval forces of Taiwan and the PRC to predict a Communist victory despite the *Red's* technological inferiority.[19] Energy and enthusiasm helped China overcome its major challenges to modernization.

However, analysts neglected to mention that these attributes also made China's population all the more susceptible to propaganda and control. The challenges facing the PLAN were formidable, which included illiteracy, a lack of skilled work force, and inadequate transportation.[20] As a result, although many improvements appeared on paper, the quality of the industrial goods produced was questionable. The successes that China experienced in building submarines during this period came about mainly as a result of Russian aid. Nevertheless, the combination of Chinese high spirit and Soviet expert knowledge created the beginnings of an effective Young style navy. By the decade's end, China had built up a land based coastal defense, where torpedo boats, small submarines, and aircraft made up the effective components of China's Navy.[21]

Yet equally clear to the Chinese was that China was far from being a first class naval power. In 1957, the PRC defense minister admitted that China had a long way to go in this regard. He stated that the effective defense of China's entire coastline required 300 submarines.[22] By any standard, this estimate was numerically high, which was perhaps an indication of army influences, where masses compensated for technological inferiority. The PLAN possessed by this time 21 *W* class submarines and a few more out-dated models. In July 1959, an American naval aircraft tracked a Chinese Communist *W* Class submarine in the Yellow Sea. The US aircraft shadowed the snorkeling submarine for a total of fifteen minutes. At no time did the Chinese submarine use its periscope. Additionally, its depth control was erratic and the submarine did not seem to realize the presence of their observers.[23] In May of 1960 a Chinese submarine sank in Yangtze River. U.S. Naval Intelligence speculated that the casualty occurred after the submarine had completed a refit. Some sort of technical error might have made it impossible for the submarine to properly rig for dive.[24]

The intelligence on the weaknesses of the PLAN Submarine

Force had a curious effect on the American war planners, which was clearly indicated by the tone of relief on the part of analysts in some of the reports. Indeed, there were ample reasons for such a relief because there had been great uncertainty as to what the future held for China as the Communist giant was going through a phase of ideological intoxication manifested in Mao Zedong's Great Leap Forward. For a while, this proletariat stringency armed with a growing naval force had been making a radical regime all the more threatening. Now, the signs of a Chinese submarine's weaknesses confirmed the beliefs of the American analysts that, although China had produced numerous submarines, it still had very little practical experience in their operation and that the PRC seemed to put more emphasis on the quantity of submarines produced rather than their operational capability. This would seem to mesh with the western understanding that the PLAN existed in no small part to enhance China's international prestige. It was also believed that China had to occasionally stage a *show of the flag* in order to inspire other third world countries.[25] Yet, one must conclude that although China certainly had a long way to go if it were to ever compete with western navies, the progress was indeed impressive. In less than a decade, it had created the largest indigenous navy in Asia. This was both an article of pride and the beginnings of an effective defensive force.

THE PEOPLE'S WAR AND SUBMARINES, 1960-1974

Things were to change dramatically in the 1960's. Due to a fierce ideological dispute between the Soviet Union and China, primarily over the issue of war and peace, the generous flow of aid from the Soviet Union ceased at the beginning of the decade. Internal disruption caused by the Great Proletariat Cultural Revolution further hampered naval development. It was a challenging time within China, the entire population being forced to participate in numerous political struggles against real but mostly imagined *capitalist roaders* and *bourgeois reactionaries*. It was also a time of dramatic upheaval and change. Radical youths known as Chairman Mao's Red Guards struck out at and replaced professionals in the fields of education and medicine. In addition, millions of people died from starvation brought on by farming *innovations*. This caused

great uncertainty and disruption to China's weapons programs.

Besides the internal discord, it was the evaporation of Russian aid that became the largest challenge China's submarine program was to encounter. In late 1957, the *eternal friendship* between the two Communist juggernauts began to unravel. Both countries were making appeals that the other was unwilling to grant. Significantly, many of these requests revolved around submarines. Although on October 15th, 1957 Russia agreed to provide a prototype nuclear weapon to China, it refused to share information on its nuclear powered submarine, a program about which the Chinese felt very strongly. Worse yet, the refusal of providing a nuclear powered submarine led to increasing acrimony and suspicion between Moscow and Beijing, which in turn led to Russia's refusal to honor its previous promise to provide nuclear weapons to China.[26]

Breeding further ill-will, the USSR wanted to install long wave radio antennas on Chinese soil, so that it could communicate with its submarines in the Pacific Ocean. The PRC saw this request as attempt to spy on and control Chinese intelligence. Additionally, the Soviets proposed that the two nations create a joint submarine flotilla. The second suggestion inflamed China's understanding of an autonomous state. To China, an acceptance of such an offer would forsake the values that energized the nation and drove the revolution. It was an attempt to undermine China's freshly established self-rule.[27] Mao made this quite clear when in response to the Soviet proposals, he declared that this idea was an "insult to our national pride and our sovereignty!"[28] The Sino-Soviet break clearly showed that China was more concerned with self-determination and independence than with uniting the world's proletariat. It was therefore believed that there had been ulterior motives governing Soviet generosity for which the Chinese could not stand.

Consequently, the Soviet Union ceased sending aid to the PRC, and the camaraderie eventually deteriorated into open hostility and bloodshed. Although on the one hand Soviet aid had been a tremendous boon for the Chinese, it established tight boundaries upon the course of naval development. With all the free services rendered, it would have been nearly impossible for the Chinese not to accept the material and wisdom of their benefactors. In 1960, these constraints fell away and thus allowed China the opportunity to reevaluate the

type of navy that it wanted to build. No longer would Soviet expertise guide the development of China's military. Rather, all efforts to build a navy would have to rely on the experience gained in the previous years of partnership and on the goals laid out by China's leaders. However, it must be stated that despite being given this chance to alter the course of its naval development, China continued to build the implements of the Young School of maritime strategy.

Through all of this turmoil, the PLAN persisted in building submarines after only a brief hiatus. It is important to note that the Chinese had learned enough from their benefactors to continue the assembly of submarines in their absence. However, there was a two year delay as Chinese engineers tried to solidify their knowledge. By September of 1961, China had outfitted two of the four submarines that it was unable to finish assembling immediately after the withdrawal of Soviet aid.[29] Eventually, all four were assembled, which the analysts at the Defense Intelligence Agency saw as "significant that in the face of this withdrawal, the outfitting of four submarines was completed."[30]

This event was significant for two reasons. Chinese engineers had absorbed enough technical knowledge to complete assembly without the presence of Soviet advisors. Moreover, enough momentum existed within China to continue with the outfitting of submarines. PRC leaders desired the relatively cheap defensive capabilities that submarines provided. An increasingly large flotilla engendered more respect. Over the long haul, it was also important to keep resources flowing to maintain this valuable infrastructure. This moment marked a decision on the part of China's leaders to continue building a Young style navy. What the Soviets had given, now became China's own.

Although China had demonstrated that it could assemble submarines effectively, many challenges quickly appeared. China had yet to master the complexities of operations beneath the sea, let alone the subtleties of employing boats as useful, coordinated weapons. During the 1960's, operational readiness was always a concern. It was hampered throughout the decade by internal economic difficulties and the absence of advisors. American intelligence indicated that in 1961, of the few submarine units that

were operational, even these were unable to submerge. This same document concluded that a Soviet presence would have resulted in better readiness within the Chinese navy.[31]

Yet it is a mistake to assume that China's submarine development would witness a precipitous decline in the years to come. Curiously, though, it was during this time that the slowed pace of advancement within China resulted in a changed attitude and focus of American intelligence. Attention shifted away from Chinese naval development. Where these reports once indicated concern of a strengthening enemy, over time they would superciliously begin to dismiss the gradual advancements of a third world nation. A strange and unsubstantiated assumption crystallized between the lines of American reports, that China's limited abilities indicated curtailed ambitions. These reports seemed to forget that the PLAN was conceived in an offensive spirit and guided by a school that preached an active defense. Remote as ever, these energies remained the driving force of naval development.

Nevertheless, in 1962 the status of China's Navy continued to deteriorate. In order to survive a shortage of fuel and other resources several naval units were forced into service as fishing vessels. Submarine operations were limited to relatively shallow depths of approximately 20 to 40 fathoms. The frequency of training evolutions was minimal. None of China's submarines had undergone an overhaul since leaving the building slipways. The most activity that US Naval Intelligence could report was the transit of a submarine from the Northern Fleet area in Tsingtao back to Shanghai for repairs.[32] Intelligence described 1962 as a dismal year for China's submarines.

In 1964, American intelligence reported that the four year slowdown in submarine construction had come to an end.[33] Moreover, the PLAN had used plans that Soviets had left behind in 1960 to design two additional classes of submarines. The new submarine designs were the Romeo class long-range submarine and the Golf class missile submarine. The *R* class was an improved version of the aging *W* class submarine. Slowly Romeo's replaced Whiskey's. China would continue building Romeo class submarines through the 1980's, producing more than 80 of that class.[34]

Right before Sino-Russian relations soured in 1959, the USSR

leased to the Chinese the equipment, components, and technical data for the Golf class submarine.[35] It took five years for the submarine to appear tied up next to a pier in American aerial reconnaissance, and another two years were needed for the submarine to begin training missions. There was speculation among American analysts about the existence of a second Golf submarine. These rumors were discounted after several attempts to verify them failed in 1965.[36] The Chinese primarily used the Golf submarine as a platform with which to test submarine-launched missiles for its planned nuclear ballistic missile submarine (SSBN). It was considered to pose no threat to the United States.[38]

This appearance of the Golf class submarine caused a bit of a stir in the United States. Demonstrative of this were the numerous reports that analysts generated. There existed two different types of assessment concerning this event. Some reports predicted that China would continue building these submarines. Other estimations more accurately testified that one Golf was enough for the Chinese because of its relative ineffectiveness.

The PRC began the 1960's with a fleet of 32 relatively new attack submarines. Because of external circumstances these numbers remained much the same for the rest of the decade. Then towards the end of the decade, without external help, China once again undertook an aggressive construction program. The Chinese took the knowledge that they already possessed and applied it. The Kiangnan and Wu-chang shipyards began to show signs of life in 1964. As these dockyards produced the newer Romeo class submarines, the PLAN scrapped Russia's aging gifts. The replacement rate kept the number of submarines in the low thirties for the rest of the decade.

This effort was not limited to the production of conventional submarines. It also sought other means by which to support and improve China's fleet. In 1965, evidence appeared of the first Chinese submarine tender.[39] Once effectively deployed, this vessel would allow China to send its submarines on much farther missions. New ship model testing facilities allowed for advanced hull designs to be scrutinized. In 1965, such a complex began tests on a hull profile similar to that of the American USS BARBEL and the nuclear powered USS SKIPJACK.[40] This type of advance would allow for swifter, more capable vessels. These events clearly

demonstrated that China intended to advance its abilities in order to better realize its goals.

THE AGE OF ACTIVE DEFENSE, 1970's and 1980's

The first major change in China's maritime strategy occurred after Deng Xiaoping assumed power in the late 1970's following Mao's death. More a pragmatist than an ideologue, Deng Xiaoping had been purged in 1960's during the Great Proletariat Cultural Revolution for amongst other things saying that "it doesn't matter whether a cat is black or white; any cat that catches mice is a good cat."[41] His ascension to power after Mao's death brought on an era of changing focuses in China. Rather than rely on its masses in future combat, Deng wanted China to develop more effective weapons. He publicly asserted that quality took precedent over quantity. While China began to modernize its forces, Deng saw little chance of China entering a major conflict in the next few decades. Thus, the PRC could peacefully concentrate on nurturing its economy and military. Deng Xiaoping commanded the manner in which China should pursue these objectives by saying, "let us conceal our abilities and bide our time."[42]

This statement is most telling. During this time, China claimed a redoubled economic effort and a scaled back military budget. However, amidst these statements China saw an explosive growth in the number of its submarines. The degree of inconsistency between public policy and reality is startling in its deception. By 1971, China had increased the number of submarines to more than forty, and it had begun construction of its first nuclear powered attack submarine.[43] Three years later, the count was approaching sixty.[44] Some of the older submarines were retired when Deng Xiaoping consolidated his power in the late 1970's, but the number was still greater than fifty. Under his leadership this number doubled in ten years. In 1986, *Jane's Fighting Ships* reported that the Chinese submarine fleet numbered 110 boats.[45]

This was the fastest pace of submarine construction that had ever occurred within China. At the time, the country possessed the largest concentration of subsurface forces in Asia. All this occurred quietly, in tandem with pronouncements of China's diverting of energies to domestic economic efforts. PRC leadership drew attention away

from weapon procurement by announcing dramatic shifts in financial policy. Rather than changing its naval development under new leadership and in a time of increased prosperity, China's leaders once again made clear their support for the submarine's role. Whatever the goal, China's strategy called for a quiet buildup of submarines while shifting global attention to its fiscal policy changes.

Large numbers of diesel submarines were the *People's War* equivalent to China's enormous armies. However, China's paramount leader Deng Xiaoping correctly predicted that China would avoid major conflict for a long period of time. Strategic planners within China must have grasped the rapidly approaching obsolescence of the Romeo class submarine. In spite of this, the PRC churned out dozens of submarines of little value for an unforeseen war. Entrenched paranoia or institutional momentum may have compelled China to build so many vessels. Perhaps, China's leaders did not believe what they publicly stated, expecting China to enter very quickly into a large war after all. If this was the case, a large number of submarines provided relatively economical insurance against foreign naval intervention. Certainly, a great deal of effort and many resources had focused on submarines.

The most logical explanation for this odd confluence of events is that China merely wished to practice. The Communist Party had frequently gained knowledge by means of brute force. Manpower was the country's most readily available resource, and China regularly bartered away this commodity to make up for what it lacked in skilled labor. By feeding this industrial machine and encouraging it to produce less war-worthy weapons, China invested in a long term strategy. The rapid construction of submarines reinforced and improved the PLAN's industrial complex. These actions once again showed that China sought increased military potential.

In spite of this massive build up, China's strategic situation changed very little. The PRC's many submarines were effective only in a defensive posture. During the 1970's, the PLAN achieved the capacity to produce its own surface ships and submarines that could sustain an actual deployment. This effectively changed China's strategy from land-based to sea-based coastal defense.[46] Demonstra-

tive of this new ability, the PLAN expanded its submarine deployments southward. In 1971, for the first time, American intelligence observed a Chinese submarine in the vicinity of Hainan, the southernmost province of China.[47]

In order to better understand the purpose for which China intended its submarines, one must analyze China's actions in its several naval engagements in since 1953. Although China placed a great deal of emphasis on the development and procurement of submarines, the PRC has never used the capital ship of its navy in battle. In seven major naval engagements from 1955 to 1988, the Chinese almost never utilized the potential of their submarines. Only once, in 1955 during the battle of Yijiangshan Island, did the Chinese have a submarine ready to use against enemy forces.[48] Two additional engagements with the Taiwanese, both in 1965, did not draw out a single one of China's thirty submarines. Instead, the PLAN dispatched gunboats and torpedo boats against Nationalist ships. In the 1974 and 1979 naval skirmishes with Vietnam over the South China Sea's Xisha Islands, China's submarine force was curiously absent. These islands are located near Hainan, easily within range of China's Romeo class submarines. On neither occasion did China send out its submarines. It once again relied upon its quick and agile surface forces. In another territorial dispute with Vietnam that was China's last naval conflict of the century, China used frigates, rather than submarines, to secure its claim of the Nansha (Spratly's) Islands in 1988.[49] It must be reiterated that by this time China possessed over one hundred submarines. Vast resources had been exploited in their construction, yet it appeared that these boats were going to waste.

The best available intelligence indicates that a Chinese submarine has never joined in battle.[50] Perhaps, PLAN leaders deemed the use of submarines to be too risky, and it may have been deemed not worth the risk. Training deficiencies may have prevented submarines from getting underway. Shallow waters may have made submarines ineffective. Chinese army leaders may have been ill at ease with a weapon platform with which communications was difficult and at times impossible.

But the most logical explanation may involve the fact that submarines are considered as a weapon for a larger naval engage-

ment of strategic importance. These naval engagements were merely small clashes over territorial claims. That China only employed its surface forces to resolve these disputes indicates that submarines were set aside for major conflicts. While the PRC has been capable of only defensive operations, the only event that would draw out the PLAN's submarines was major aggression from a foreign power. Regardless of improved relations between the United States and China, America has been the only power capable of projecting naval power potent enough to threaten the ambitions of the PRC. Therefore, China's submarines have always been aligned in a defensive posture against the United States. These weapons existed to prevent an American naval intervention. Their increased production under Deng Xiaoping therefore hints at unmentioned fears.

TOWARD A NUCLEAR SUBMARINE STRATEGIC DETERRENCE

In 1974, the Office of Naval Intelligence produced a document called *The Role of the Submarine in PRC Naval Strategy*. This report made several insightful observations about China's national objectives. It asserted that the military development that had occurred over the past twenty years was directed towards establishing territorial security, achieving superpower status, and making China identifiable as the leader of the Third World. With this in mind, the author predicted that China would continue to quietly build a large number of diesel powered submarines. Smaller diesel submarines operate very effectively within 100 miles of the Chinese mainland, where the depths rarely reached 500 feet. These shallow conditions generally negate the increased abilities of fast nuclear powered submarines (SSN). Diesel submarines would adequately provide for China's coastal defense. Therefore, this report predicted that China would not focus on deploying nuclear attack submarines. Rather, the PRC would concentrate its resources on designing a nuclear powered ballistic missile submarine (SSBN).[31]

Grandiose yearnings provided the strong motivation for an SSBN. Rather than continuing with the production of the Golf class missile submarine, which was merely diesel powered and Soviet designed, China sought the prestige that resulted from the successful deployment of an indigenous nuclear powered ballistic missile submarine.

The leaders of the PRC anticipated that such a weapon would help them achieve superpower status and enhance its reputation among smaller nations. Certainly, for China to be respected as a world power it had to possess its own nuclear deterrence capabilities. Moreover, an SSBN would dramatically enhance its standing among other third world nations. The Communist Party had for years conceived of such a weapon as a bargaining chip of immense power that engendered respect and bestowed prestige.

An SSBN patrolling the Indian Ocean or the Central Pacific equipped with a ballistic missile with a range of 2000 nautical miles is able to reach the European Russia and the west coast of America respectively. The diesel powered Golf would have difficulty traveling for such great distances and maintaining station for long periods of time. Therefore from a strategic standpoint, nuclear powered ballistic missile submarines could do a much better job of establishing survivable nuclear deterrence and China had long determined to obtain such weapon platform.

Project 09 was the Chinese quest for an SSBN. During unsuccessful negotiations with the USSR in 1959, Mao declared that, "We will have to build nuclear submarines even if it takes 10,000 years!"[52] Such determination coupled with strategic concerns provided the political energy for a program that would persevere through several decades and consume innumerable resources. Beyond the daunting technical challenges, the scientists and managers that worked on Project 09 were forced to contend with violent political upheaval, burdensome project relocation, and living conditions that were inversely related to the importance of their endeavor. Throughout it all there were remarkable examples of tenacity that transcended mere orthodox approaches. Chinese researchers collected data from every means available. Not only did scientists peruse published documents and stolen secret material, but the Chinese appetite for information was so ravenous as to be absurd. In tremendous excitement, a Chinese design group came across an inaccurate model of an American Polaris submarine. They proceeded to take profuse notes while disassembling and reassembling the little device.[53]

Two separate submarine classes existed to test ideas essential for China's SSBN. The aforementioned Golf class submarine provided

the necessary platform to test underwater missile launching innovations. The Han class submarine was China's first nuclear powered vessel. Finished in 1974, the submarine's propulsion system was China's first floating nuclear reactor. Although the Han experienced many difficulties with radiation, it succeeded in teaching technicians and scientists a great deal. The Han was by no means an end, it was merely another step towards a larger goal.

After nearly three decades, Chinese persistence succeeded in giving the PRC underwater nuclear deterrence. In 1988, the PLAN successfully fired the JL-1 submarine-launched ballistic missile from the country's only Xia class submarine. Henceforth, China possessed the third and most survivable vertex of the nuclear triad. The PLA's land-based missiles and plane-dropped bombs, though effective, were vulnerable to an enemy's first strike. The new underwater strategic capability required rules that grew out of previous policies pertaining to the use of land-and air-based nuclear weapons. When Mao first demanded that nuclear weapons be a part of the PLA's arsenal, he conceived a number that would make China just potent enough to deter other nations. Therefore, it is generally believed that the nuclear weapons aboard the Xia class submarine are handled according to these six rules: 1) no first use; 2) soft target kill capability; 3) smaller but better; 4) smaller but inclusive; 5) minimum retaliation, and 6) quick recovery.[54]

CONCLUSIONS

For the past fifty years, China has steadily increased the number and quality of its submarines. Although the USSR created the foundations of the PLA Navy, China has not altered its essential components. Because China has never utilized submarines in any of its several naval skirmishes, it is clear that these weapons existed to defend against a major foreign intervention of strategic importance. While in the past fifty years China has been threatened by both superpowers, only the United States possessed the ability to truly meddle in China's maritime affairs. Therefore, China's diesel submarines existed to oppose the possibility of American aggression.

The submarine is the most cost effective platform for dealing with surface combatants. China has never sought a head-on collision with the might of America's surface navy. It realized early on that

the effort necessary to reach parity with the United States was too great. Specifically, the threat of US naval airpower has deterred China from developing a large surface fleet. Submarines on the other hand, stand a much better chance of survival. In addition, stealth and surprise make them an inherently offensive weapon. Although China still lags behind the United States with regard to underwater technology, it has purchased or stolen information that has resulted in constantly increasing capability. Thus, the gap between American and Chinese submarines is closing. Certainly, China has a great deal more ground to cover, but it only takes one capable submarine to place an entire carrier battle group into jeopardy, and therefore neutralize America's naval power projection.

China has bestowed tremendous value on this program from its inception through the present. In the beginning, China built its submarines behind concealments, while other vessels were assembled in the open. In a time of economic strife, China allocated enough resources to continue building these submarines. Finally, amidst military budget cuts, the number of Chinese submarines skyrocketed. All of these events indicate how seriously China has taken the threat of American naval intervention. It is reasonable to assume that this perception remains unchanged.

Through fifty years of change, China's desires have remained unaltered. The PLA Navy still exists to safeguard China's territorial integrity, to conduct a possible blockade of Taiwan, and to defeat a sea-based invasion. With the addition of a SSBN, China has added to its naval objectives the requirement of making ready survivable nuclear retaliatory forces.[55] Although in 1953 China was unable to achieve these goals, it has steadily crept closer.

It is important to remember that for decades China's Navy was exclusively capable of a defensive posture. It did not have the ability to act too aggressively. This does not indicate a predilection for dormancy. Rather, in 1974, the ONI reported that "the deployment of nuclear powered submarines may be the event which initiates the change in PRC naval strategy from defensive to offensive."[56] Nuclear submarines can operate at greater distances and speeds than their conventional counterparts. Although in recent years technology has substantially enhanced the underwater stamina of diesel submarines, only nuclear submarines are freed from the burden of

having to refuel. In the event of an oil shortage, this makes nuclear propulsion essential.

Currently, China is in the middle of this transition. It has acquired the abilities to sustain longer periods of underwater deployment. Although it has possessed the Han class submarine for a number of decades, only recently has it become an effective platform. Thus, China's naval actions are evolving. It no longer remains necessary for Chinese submarines to sit back, idly waiting for an American aggressor. The actions of the PLAN will begin to reflect the offensive nature of the navy's origins. The Navy was conceived to participate in the recovery of Taiwan, the keystone of East Asia. As the Office of Naval intelligence noted in 1953, "if a line [was] drawn from Shanghai to Manila and another from Saigon to Tokyo, the crossing of the 'X' is in the heart of Formosa [Taiwan]... a place of unquestionable strategic importance."[57] The chosen apparatus of this recovery was a school of naval warfare that espoused an active defense. Neither the PLAN's origins nor its strategy precludes preemptive strikes. Indeed, the appropriate situation might demand such an action undertaken by submarines.■

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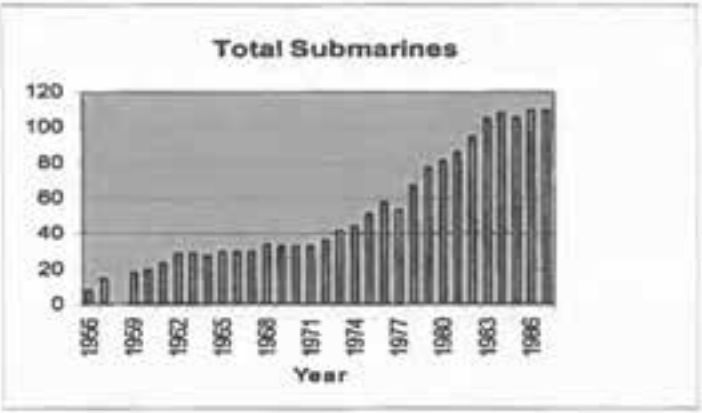
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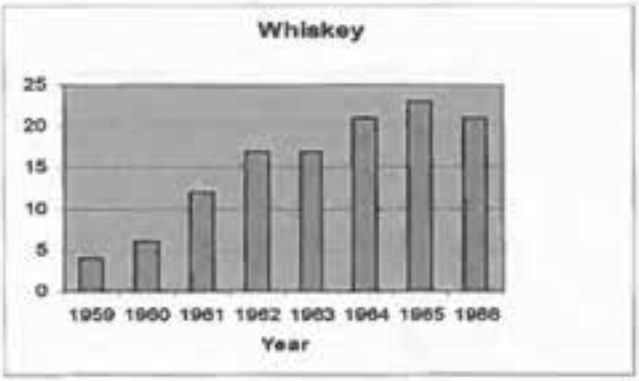
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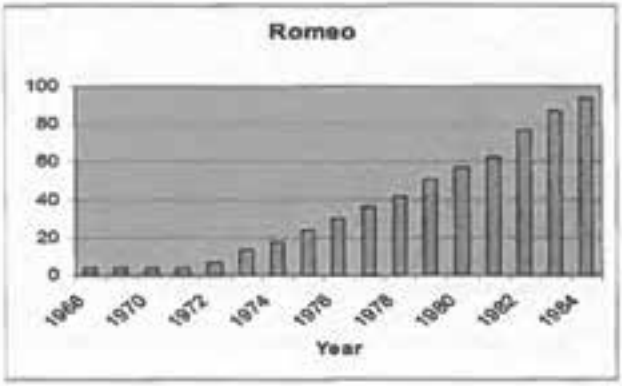
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USS SEGUNDO SS-398 Apr 9-13, 2007
LOC: Edgewater Hotel, Laughlin, NV
POC: Ken Owen E-mail kenowen1@cox.net You will receive an e-mail with additional info and a registration form in November.

USS CHOPPER SS-342 Apr 16-21, 2007
5 days, 4 niths with stops in Key West and Nassau
POC: James Murphree, 2129 Clarendon, CT, The Villages, FL 32162-7718
Phone: 352-753-0751 E-mail: jfmurphree@aol.com

USS SENNET SS-408 Apr 22-26, 2007
LOC: Holiday Inn, Mt. Pleasant, SC
POC: Ralph Luther, PO Box 864, Summerville, SC 29484-0864
Phone: 843-851-7064 E-mail: rluther@bellsouth.net

USS POMPON SS/SSR267 Apr 26-29, 2007
POC: Bill Davy, Phone: 248-689-6369, E-mail: Judydd@wowway.com
Web Site:
http://www.hometown.aol.com/dgweg/myhomepage/pomponreunion.html

USS GEORGE WASHINGTON CARVER SSBN-656 May 16-19, 2007
LOC: Jacksonville, FL
POC: Tom Hanley, 42 Ackerman Road, Warwick, NY 10990
E-mail: webmaster@gwcarver.org Web Site: http://www.gwcarver.org

THE FUTURE OF SWEDISH SUBMARINES

by Olle Mobergh LCDR,
Swedish Armed Forces

Editor's Note: LCDR Mobergh's paper on Swedish Submarines won the Naval Submarine League Prize at the Naval War College.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Swedish Armed Forces.

Abstract

Sweden has had submarines of several different types and in (for Sweden) adequate numbers since the early 1900's. Even though Sweden is a small country it has managed to construct and operate cutting-edge, diesel-electric submarines for more than a century. The two types Sweden operates today are among the best diesel-electric submarines with AIP that exist in the world.

The small, diesel-electric submarine can participate in the execution of almost every task available to Navies operating in a littoral environment. If such a submarine is also equipped with AIP, it's a potent and fairly long-lasting operational partner. Even so, the tasks that could be handled by a submarine can, to a very large extent, be taken care of with other means given the technologies that exist today.

Reading the official documents from the Swedish Armed Forces, the European Union and comparing them to the official writings of the US Navy, I find some differences. Sweden and the EU hardly talk about their naval assets and eventual tasks at all (never even mentioning submarines), whereas the US navy is clear and specific as to what it has in its submarines for today and its vision for the future.

In spite of all the tasks that other units can do just as well and probably cheaper than a submarine, I still *recommend* that the *Swedish submarines should persist within the Swedish Navy*, mainly because; they can, better than other units, pursue two of the main tasks for the Swedish Armed Forces when an opponent comes from

the sea, and they are an important security tool in the tool-box for a Maritime Component Commander, be it *nationally* or *internationally*.

The Future of Swedish Submarines

In 1904 the Swedish King Oscar II approved the drawings for making the first Swedish submarine. The submarine named HMS HAJEN (the Shark) had already been under construction since 1901. Nevertheless, 1904 is considered the birth of the Swedish Submarine Force and since that day the Kingdom of Sweden has had some 80 submarines of 25 different types.[1] Today the Swedish Navy includes five submarines of two different types; three submarines of the GOTLAND class and two of SÖDERMANLAND class. All of which are equipped with AIP (Air Independent Propulsion).

During the Cold War era (1945 through the 1980's) Sweden had at least twelve submarines, mainly to deter other nations from trying to invade her country, especially coming from the sea. Mainly stationed in the Baltic Sea with its dramatic bottom configuration (deep canyons and steep cliffs under the surface), and an average depth of less than 70 meters (210 ft), the size of Swedish submarines was (and still is) essential. There is simply not enough operating space for large, oceangoing, nuclear submarines in the Baltic.

After the dismantling of the Berlin Wall and the subsequent collapse of the Warsaw Pact, Sweden has gradually decommissioned and reduced its number of submarines. This has been done either by selling them (as Sweden did with the *Sjöormen*-class) to another country[2], or by scrapping them (as is happening to the *Näcken*-class). Since Sweden's neighboring countries around the Baltic Sea (Estonia, Latvia, Lithuania and Poland) gained their independence and the Cold War came to an end, the operational focus of effort for Swedish submarines has been altered to some extent.

Since 1995 Sweden has been a member of the European Union (EU). This membership in conjunction with the lack of a conventional, potential threat against Sweden as a whole, led to the reorganizing and reshaping of the Swedish Armed Forces. This has led to a decrease in the budget for the Armed Forces, and today (2005-06) the budget for the Armed Forces is down to about 5 billion USD annually. Around 2003 the EU started its work on

organizing so called *Battle Groups*, which will consist of approximately 1500 soldiers and shall be rapidly deployable (within 10 days). In 2004 Sweden volunteered to be lead nation for one of the Battle Groups (BG) and this, the *Nordic Battle Group*, shall be operational and on alert in the first half of 2008. It consists of mainly ground units (the core is a mechanized battalion of 750 men). The units in the *Nordic Battle Group* will not only come from Sweden, but also from Estonia, Finland and Norway.

With Sweden not experiencing a severe threat from any state, being a member of the EU, committing to lead and being the main contributor of forces and equipment to the *Nordic Battle Group*, being a member in the *Partnership for Peace* program with NATO and having reductions in the budget for the Armed Forces, I wonder if Sweden *can* and/or *should* maintain their five submarines, and *if the submarines should persist* within the Navy, *what are their unique tasks*? By examining what is written in Swedish official documents and some of the Swedish Armed Forces doctrines[3], what is officially said in the EU and with a comparison as to what the US Armed Forces officially states regarding their submarines, I will address these questions. I shall not make any comparisons or studies as to what is said within NATO, as Sweden is not a member of that organization.

The Swedish Documents

It is today harder to differentiate between *national* and *international* security. The mutual vulnerabilities and border crossing threats means that Swedish as well as international security interests more and more coincide. It is today's central task for Sweden to be a part of the international community in its struggle to meet the global threats, in order to strengthen Sweden's internal security. In today's world it is equally important to guard the free flow of goods, as it was yesterday's necessity to protect one's own borders.[4]

Since the collapse of the Warsaw Pact, the conventional threat of an invasion against Sweden has steadily diminished and any conventional military attack against Sweden is considered highly unlikely within years to come. Even so, Sweden should keep its Armed Forces in order to be able to prevent and counter such an

attack, regardless of its possibilities of occurring. Given this, the tasks for the Swedish Armed Forces have somewhat changed. By promoting peace, stability and security abroad, Sweden hopes to maintain peace and security within its own borders. This leads to a situation in which Sweden has to have units within all their Armed Forces Services that are highly trained, and ready to deploy within days, be it an assignment nationally or, more likely, internationally.[5]

With this in perspective, Sweden has maintained several different types of units to be part of operational groups, be it within the EU or otherwise, but even so, the fundamental tasks for the Swedish Armed Forces remain unchanged; **to defend Sweden against armed attack, to maintain Swedish territorial integrity, to contribute to peace and security in the world and to assist Swedish society in times of severe peacetime difficulty.**

The Swedish Navy and its Doctrine

It can be concluded, as previously mentioned, that the new threat to the world is not as much states waging war on each other over territory, but instead something different, often even without a state as the official aggressor. From current experience, the new threats, while they are small in organizational size, still can inflict grave damage. Within the maritime arena this new threat is mainly against commerce. As 98% of the world's trade is going over sea, this poses a great threat. Having a disruption in the global maritime trade at a specific choke point would severely affect the world's economy. Thus Sweden, together with a lot of other nations in the world, concludes that not only must our Navies protect our territorial integrity and defend our nation against armed attack—but we must also assist in the protection of the trade routes at sea.

The Swedish Navy has during a long period of time, developed its capabilities for handling its missions within the Baltic Sea and in its specific environment. The Navy, including its submarines, has a unique capability of operating in shallow waters, close to the coastline and in very tight straits and waters. It's therefore imperative that we use this Navy where its capabilities are maximized, nationally and internationally.[6]

So, what tasks shall one give to Swedish Naval Units? Or even more specific—what good is a Swedish small, diesel-electric

submarine with AIP? Well, the first question is easily answered, at least as to regarding the geographic area. With the specific environment mentioned in the paragraph above, the littorals! I dare list some of the tasks for Navies all over the world, and as such justify the presence of a Swedish submarine in such a task.

Tasks for a Swedish Submarine

Exercising control at sea is a modern translation of the old navy-term "Command of the Sea". To have total control at sea is not very easy to accomplish, nor is it, in most cases, necessary. What is essential today is the ability to prevent your opponent from prohibiting you or your merchant shipping from going about their business. This can easily be managed with a submarine, as a part of a *blockade* if necessary. Anyway an ultra silent, air independent submarine can patrol a littoral choke point for several weeks without being detected.

Also with the task of *maintaining control* within a specific area, one could use a submarine. Why? To maintain control means to be able to control it in *all dimensions*. Certainly a surface vessel with a Towed Array Sonar (TAS) could achieve most of this, but the submarine has far greater equipment and the ability to *operate covert*.

To *counter your opponents control* is preferably made with a submarine if you want to prevent your opponent from being able to act and yet keep a low risk profile of the mission. A submarine could lay offensive mines (shot as torpedoes) or just sink the opponent's navy ships.

A submarine can be an essential part of a *Fleet in being*, thus binding your opponent both ships and geographically, depriving him of freedom of movement by forcing him to concentrate his effort in specific regions.'

A submarine is very helpful when it comes to covert operations, such as insertion of Special Operations Forces. That could be called *covertly forward from the sea*?!

Ultimately and foremost a submarine is used for *depriving your opponent of the possibility to invade* your territory thus coming from the sea. By threatening him and sinking his tonnage whilst trying to invade, you just might prevent a long, protracted ground war.

The European Union Documents

Being a union of 25 states who together produce over a quarter of the world's Gross National Product (GNP), with a population of over 450 million people and a variety of different instruments at its disposal—the European Union is definitely a global player. During the last ten years European forces have, as American, deployed to as distant places as the Democratic Republic of Congo, East Timor and Afghanistan. Be as it will with the participation and rapidness of European interaction on the world stage—the European Union has to shoulder its part of the responsibility for building a more secure world, and securing global security.[8]

The perceived threat according to the EU

A large-scale invasion towards any of the EU member states is no longer perceived as an imminent threat. Instead, Europe is facing new, more diversified threats. These threats are less detectable and also less foreseeable. *Terrorism* is one which endangers the life of several, imposes large costs and poses a growing strategic threat to Europe. So far *Europe has been both a harbor for and a target of* such terrorism. Another perceived threat is different *regional conflicts* around the world, conflicts such as the one on the Korean Peninsula, in the Kashmir region and in close vicinity of Europe itself, especially in the Middle East. Thirdly, *failed states* are perceived as a threat, especially when they harbor and bolster terrorists and criminals. This phenomenon is troublesome, as it could lead to the undermining of the global economy and stability. Recent examples would be Liberia, Somalia and Afghanistan.[9]

How will the EU counter these perceived threats?

Today, every threat demands co-operation between different parts of DIME (Diplomatic, Informational, Military and Economical means). It's no longer possible to encounter the threats of today (and perhaps tomorrow) with merely military means, simply because the threats are no longer primarily military, as was the very massive and visible threat during the Cold War. To handle the threat of *terrorism* one would probably have to use a mixture of police, intelligence, military, judicial and other means. When dealing with *failed states*, one would not only need the presence of military power to restore

order, but also a large portion of humanitarian aid in order to address the humanitarian crises that often follow in the wake. As for *regional conflicts*, they will primarily be helped by political efforts, but military resources and efficient police forces are for the most part needed in the aftermath of the conflict itself.[10]

Being a union of 25 states that contributes more than 185 billion USD for their defense, the EU should be able to uphold more than one mission at a time. The EU should support the UN when it reacts to threats to the global security and peace. The EU will persist in its support and co-operation with the UN.[11] The standpoint of the European Union can be summarized in the following quote:

> "A number of countries have placed themselves outside the bounds of international society. Some have sought isolation; others persistently violate international norms. It is desirable that such countries should rejoin the international community, and the EU should be ready to provide assistance. Those who are unwilling to do so should understand that there is a price to be paid, including in their relationship with the European Union."[12]

The European Union and its Battle Groups

Since the meeting of the European Council in December 2003, when the earlier mentioned *European Security Strategy* was adopted, the EU has also adopted the so called *2010 Headline Goal*. In this text the Member States commit themselves to be able, by 2010, to respond rapidly and decisively to the whole spectrum of crisis management operations covered within the Treaty on the European Union. These crisis management operations include peacemaking, peace-keeping and humanitarian and rescue tasks.[13] The key element in the *2010 Headline Goal* is to be able to swiftly deploy military effective, credible force packages, based on a Battlegroup concept. These Battlegroups are formed with a core function of a mechanized battalion with surrounding support and service units. The ambition is that the EU should be able to take a decision to launch an operation within five days. A ground mission should be *on station* within ten days after this decision.

But, this goes not only for ground forces; the European Council

also states, *specifically*, that "Relevant air and naval capabilities would be included" and that "These high readiness joint packages (battlegroups) may require tailoring for a specific operation by the Operation Commander."[14] And this is where I see, for instance, a Swedish submarine entering the arena. As I stated earlier (page 5), there are several tasks that are suitable for a submarine. In some cases, I would argue, even *preferably* handled by a submarine. There could, for instance, be the need for covert intelligence gathering whilst not exposing oneself over the horizon, for substantial amounts of time (weeks), assisting in perhaps both the insertion and extraction of Special Operations Forces. Unfortunately this has not yet been properly addressed within the Swedish Armed Forces (personal reflection).

The United States of America—a comparison

The US Armed Forces have, undoubtedly, the largest functional navy in the world. Even so, the US Navy has, for a period of years, pursued the effect and organization of a blue water Navy with mainly large ships and large nuclear submarines (none of the latter is diesel-electric by the way). It is interesting to read about the ongoing debate regarding the restructuring of the US Navy. This is clearly stated with the words of the new US Navy Chief of Naval Operations (CNO), Admiral Mike Mullen, and the statements of the Chief of Naval Operations Submarine Warfare Division. The CNO talks about restructuring the US Navy to be able to operate in the entire maritime spectrum (from Blue to Brown waters), as in his speech at the Naval War College;

> "We've got a great Navy right now, a fleet that has proven its flexibility in a dynamic security environment,...
> But we also need a fleet that can operate at the other end of the spectrum. We cannot sit out in the deep blue, waiting for the enemy to come to us. He will not. We must go to him....
> We need a green water capability and a brown water capability and quite frankly, I want a more robust onshore capability, I want a balanced force in every sense of the word....
> Balanced to operate in, and command, if need be, all things maritime - from the darkest corners of ungoverned waters, to

the well-sailed sea-lanes of world trade...
I want the ability to go close in and stay there."[15]

Looking at the writings from the US Navy Submarine Warfare Division I find some similarities;

> The threats that future submarines face will drive *the transformation from the submarines of today to the submarines of the future*. They will be called upon to perform new missions to use their new capabilities while remaining forward deployed throughout the world.
>
> With the proliferation of technology and advanced weapons systems, potential enemies will continue to develop the means to *deny access to U.S. military forces in specific areas* of the world. These countries will attempt to employ low-cost, readily available technologies in an asymmetric way to counter the advantage that U.S. forces otherwise have. Examples of these *asymmetric threats* can include the use of mines, *diesel submarines with improved underwater endurance*, anti-ship cruise missiles, and weapons of mass destruction.
>
> Submarines of the future must be able to operate in an increasingly hostile *littoral environment* with increased capability in order to assure access for other U.S. naval and military forces.[16]

Given the above, I would argue that the US Navy realizes the potential of diesel-electric submarines with AIP, and that the US Navy has, so far, missed or neglected the use of smaller/quieter submarines to be able to operate wherever the US Navy wants (i.e. in the littoral waters close to most coastal nations where they can't really operate today).

Nevertheless, the US Navy recognizes that submarines with stealth configuration and minimal logistic requirements are the way of the future, and that this makes submarines ideal for operations in hostile, forward-deployed areas. The tasks for these submarine operations form a broad variety; gathering vital intelligence undetected, destruction of threats to a surface navy, the ability to insert special operations forces and other operations.[17] What I

presume we will see in the future is perhaps a future US submarine class which is significantly smaller than the current submarines are. Whether such a submarine would be diesel-electric with AIP or not remains to be seen. Another possibility for the US Navy is a closer cooperation with allies in the littoral arena. Sweden has a lot of capabilities derived from working in its own physical surroundings along the Swedish coast and in the Baltic Sea. Such cooperation is currently being executed as the Swedish submarine HMS GOTLAND is leased by the US Navy and exercising with them on the West Coast, a project supposed to last until this summer.

For the US Navy to perceive small, perhaps diesel-electric, submarines as merely *asymmetric threats* and not as a future for their own navy is, in my opinion, to stick your head into the sand. If you want to operate in the entire arena—you must also equip and train yourself accordingly!

The Discussion—Pros and Cons

The Pros

I have presented in this paper that a submarine can be a part of many different tasks. *Exercising control at sea, blockade, Fleet in being* and *depriving your opponent the possibility to invade* are some of these tasks. A modern, relatively small diesel-electric submarine with AIP has possibilities to operate that a modern, relatively large, nuclear submarines have not. It is quieter and its small size gives it the possibility to operate in arenas where the nuclear submarine will not. It has a considerable endurance given its technology.

> "When commanders cannot anticipate the enemy, launch the few against the many, employ the weak to strike the strong, and the forces have no spearhead, there is downfall."[14]

Swedish submarines have exercised with American, British, French and German naval vessels, all of which have had some difficulties in both detecting and tracking the Swedes. A diesel-electric submarine, clearly, has special advantages, especially when it comes to covert operations.

This is not only because certain navy ships had bad days, but because *if naval vessels designed to find submarines have trouble*

finding them—what would other vessels/units have? What good couldn't a diesel-electric submarine do for its employer, given the submarine's characteristics? What harm couldn't the submarine do to the opponent? There must be a reason for the US Navy leasing a Swedish submarine equipped with AIP?!

Last but not least—the submarine is, as stated on page 3, a vital part of fulfilling some of the core tasks of the Swedish Armed Forces; **to defend Sweden against armed attack and to maintain Swedish territorial integrity**. The deterrence factor a submarine, operating free at sea, imposes against an aggressor in the same arena is substantial. If the aggressor is determined to pursue his invasion, he'll have to concentrate his efforts to: either find and destroy the submarine, or he'll have to protect his own mission to such an extent it will probably give his intentions away and/or slow him down. To the defender this is essential for his survival.

The Cons

In today's modern society, many of the tasks mentioned here that are suitable for a diesel-electric submarine can be executed by other means. By listing the tasks and giving alternatives, I shall try to give a somewhat more balanced picture of the necessity for, or perhaps, non-necessity of having diesel-electric submarines within the Swedish Armed Forces. *Exercising control at sea and blockade* are two tasks I find suitable for a submarine. Even so, recent international operations (like the Adriatic Sea) show that this role is more likely to be performed by surface-vessels, as the desired effect is not only deterrence but also the *visible presence*, the *show of flag*. With these tasks also comes the necessity to be able to board vessels, not accomplished easily from a submarine. You would also like to be able to warn a vessel trying to interdict your blockade. Sinking the vessel would probably not be the first method popping up in the mind of the Task Force Commander.

To *counter your opponent's control* is another task mentioned earlier. With the technology existing today this can be accomplished by using UAV or satellite imagery over your designated area, in conjunction with precision-guided munitions/missiles you'll be able to oppose your opponent's control with very low risk for your own units.

I've also addressed a *Fleet in being* as a task. The historical use of the term isn't really about submarines, and need not be today either. Having modern ships in your navy, perhaps with stealth technology as the new VISBY-corvette, with sufficient amounts of surface-to-surface missiles, can make very potent opponents which will be taken into consideration by an adversary. Even if the corvette can't use its own missiles, they have superior sensors as to the surface and above surface arena and can thus lead an airborne threat to the targets.

Maintaining control was another task addressed. Given the advantage the submarine has in its unique environment—subsurface, I would argue that this is but a small part of the operational environment. Yet again, using modern technologies such as sonar-buoys, UAV'S, UUV's (Unmanned Underwater Vehicles), radar, satellites and such, controlled from a surface vessel, you have almost the same control.

The ability to *insert Special Operations Forces* covertly was covered as well. Sorry, but this can also be done without the use of a submarine. They can infiltrate over land borders as well as jump out of airplanes at high altitude far away from their landing zone. The risk is that they are detected by radar falling down, but they can likewise be detected by units patrolling the beaches/cliffs where they plan to come ashore for the same reason.

Another disadvantage with submarines is that they are expensive, very expensive. You pay considerable amounts for constructing and building a small number of vessels. Having them operational is not very cheap either, given the time it takes to get a crew fully operational (there are some educational matters to address as this type of unit mainly works submerged), as compared to a surface ship.

Finally, I will address the lack of (official) writings coming from the Swedish Armed Forces Headquarters and their current hot pursuit of the *Nordic Battle Group*. The Navy (submarines not even mentioned) and the Air Force are hardly given the benefit of the doubt here. Neither did I find anything about submarines on the official sites of the European Union (except the quotes given on page 8, which with some positive thinking could relate to submarines). If the current situation derives from political or military will, I don't know.

Conclusion and Recommendations

> "The test of a navy in the last analysis is not its ideology, but its practical value—its ability to fight successfully on the sea or to support a fight from the sea."[19]

In this paper I have tried to shed some light over two questions; if Sweden *can* and/or *should* maintain their five submarines, and *if the submarines should persist* within our Navy, *what are their unique tasks*? I answered this by examining what is written in Swedish official documents and some of the Swedish Armed Forces doctrines, what is officially said in the EU and with a comparison as to what the US Armed Forces officially state regarding their submarines. I have presented a short, subjective comparison—"Pros & Cons" and with which to bring it all together.

Sweden has had submarines of several different types and in (for Sweden) adequate numbers since the early 1900's. Even though Sweden is a small country it has managed to construct and operate cutting-edge, diesel-electric submarines for more than a century. The two types Sweden operates today are among the best diesel-electric submarines with AIP that exist in the world.

A small, diesel-electric submarine can participate in the execution of almost every task available to Navies operating in a littoral environment today. If such a submarine is also equipped with AIP, it is a potent and fairly long-lasting operational partner. Even so, the tasks that could be handled by a submarine can, to a very large extent, be taken care of with other means given the technologies that exist today.

Reading some of the official documents from the Swedish Armed Forces and the European Union and comparing them to some of the official writings of the US Navy, I find some differences. Sweden and the EU hardly talk about their Naval assets and eventual tasks at all (never even mentioning submarines), whereas the US Navy is clear and specific as to what it has its submarines for today and its vision for the future.

In spite of all the tasks that other units can do just as well and probably cheaper than a submarine, **I still recommend that the Swedish submarines should persist within the Swedish Navy**, mainly because the submarine can, better than other units, pursue two of the main tasks for the Swedish Armed Forces when an

opponent comes over the sea, and they are an important security tool in the tool-box for a Maritime Component Commander, be it *nationally* or *internationally*.

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TOBACCO SMOKING ABOARD U.S. NUCLEAR SUBMARINES

by CDR C.J. Jankosky, MC, USN
COMSUBPAC Force Medical Officer

The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the U.S. Government.

It has been through exemplary people that the United States has forged the finest Submarine Force in the world. Submariners must possess both psychological resiliency and a superior intellect to function in the demanding submarine environment. This elite workforce is maintained through the solid support submariners provide for one another in a demanding environment, combined with excellent services centered on the maintenance of mental and physical health.

The Submarine Force has taken the lead in designing and building the finest engineering systems to protect worker health. Accidental injury, radiation exposure, and airborne contaminant inhalation have been significantly diminished through development and strict enforcement of health policies. The Navy leadership's strong support of automobile seatbelts, motorcycle helmets, regular exercise, healthy diets, and the responsible use of alcohol have further improved the health of the submarine community. But smoking remains an obstacle to maximizing force health promotion.

On June 27, 2006 the U.S. Surgeon General issued a comprehensive scientific report which concludes that there is no risk-free level of exposure to secondhand smoke. It states that smoke-free workplace policies are the only effective way to eliminate secondhand smoke exposure in the workplace. Separating smokers from nonsmokers, cleaning the air, and ventilating buildings cannot eliminate exposure. Additionally, the report concluded that workplace smoking restrictions lead to less smoking among covered workers.[1]

In this article I will review the complex medical, social, and political threads that have woven our nuclear submarine smoking

policy. The nuclear Navy expects its officers and enlisted to do their job with a sense of ownership, responsibility, and attention to detail. The importance of being able to face the facts and to resist the natural human inclination to hope things will work out, despite evidence or doubt to the contrary remains a major tenet for our Submarine Force.[2] It is now time to face the problem and make smoking on submarines a thing of the past.

Tobacco Smoke Adversely Affects Human Health and Military Readiness

That tobacco smoke can be harmful is an established fact. Tobacco manufacturers publicly recognize the potential for adverse health effects of secondhand smoke (also known as environmental tobacco smoke): "Public health officials have concluded that secondhand smoke from cigarettes causes disease, including lung and heart disease, in non-smoking adults ... in addition, public health officials have concluded that secondhand smoke can exacerbate adult asthma and cause eye, throat and nasal irritation" (from the Philip Morris Co website).[3]

The adverse effect of cigarette smoke on the submarine population is clarified in SECNAVINST 5100.13C: "Tobacco use and Environmental Tobacco Smoke Exposure have an adverse impact upon health and readiness of our forces. Tobacco adversely affects night vision, respiratory capacity, wound healing rates, and contributes to risk of cold injuries, including frostbite. Statistically, smokers have higher accident rates than do nonsmokers".[4]

The Precautionary Principle is the Standard for Tobacco Policies

When defining new policy it is common practice to develop recommendations based on scientific research. There is enough evidence from thousands of published studies of non-submarine smokers to conclude that both smoking and secondhand smoke cause adverse health effects in our submarine population. The responsibility to take action is based on the precautionary principle. This principle is based on the supposition that to delay action will ultimately prove more costly.

Current U.S. tobacco policy is based on the precautionary principle. Executive Order 13058 protects all federal employees from exposure to tobacco smoke. Designated smoking areas must be enclosed and exhausted directly to the outside and away from air intake ducts, and maintained under negative pressure (with respect to surrounding spaces) sufficient to contain tobacco smoke within the designated area. However, Executive Order 13058 does state that the head of any agency may establish limited and narrow exceptions that are necessary to accomplish agency missions.[5] How smoking would be necessary to accomplish a mission is not clarified.

The Department of Defense Instruction on Smoke-Free DoD facilities (DODI 1010.15) prohibits indoor designated smoking areas unless exempted as per Executive Order 13058[6]. The Navy and Marine Corps tobacco policy (SECNAVINST 5100.13C) is based upon DODI 1010.15, and even goes so far as to state that "Where conflicts arise between the rights of nonsmokers and the rights of smokers, the rights of nonsmokers to a smoke-free airspace shall prevail".[7]

Smoking policy specific for submarines is deferred to the Nuclear Powered Submarine Atmosphere Control Manual.[8] Formulated over a decade ago, it contains a recommendation against smoking in normally unmanned spaces. Among recommended spaces for smoking are the engine room, crew bathrooms, and the torpedo room. Smoking on the mess decks, exclusive of meal times, is also considered appropriate if other spaces are unavailable. Tobacco smoke guidelines for submarines clearly diverge from other Governmental and Military standards.

Smoking Restrictions on Submarines in the Recent Past

In 1988 the National Research Council evaluated submarine air quality, recommending that the Navy eliminate or curtail smoking on submarines.[9] The Submarine Force did take action to limit smoking to specific areas. Some commanding officers followed the more stringent recommendation of the committee by banning smoking on their individual boats. By 1994 a handful of smoke-free nuclear submarines were successfully operating in the Pacific.[10] Despite success at the individual command level, external pressures resulted

in the abandonment of this policy. Subsequently, there has not been a smoke-free boat on either coast for a decade.

Smoking on Current Operational Submarines

Because every compartment is manned continuously, smoking always occurs in work areas with watch standers. It is sometimes difficult to accommodate smokers and non-smokers within the confines of a submarine. The following email, written by a senior enlisted to his submarine crew last month, expresses common problems at the deck plate level. "The smoking pit was moved again... Doing so, however caused the level of smoke around the stair stepper to be unacceptable, since the airflow seems to migrate the smoke that way. This piece of workout gear is used a lot, so I need to move the pit again. I'm having difficulty finding a new solution that is fair to everyone involved. I'm asking for the crew's help in suggesting a location for the smoking pit".

I directly evaluated the situation within COMSUBPAC by evaluating 4 boats chosen solely by convenience of schedule. The underway durations were from 4 to 8 days each. I spent time in the smoking areas speaking with individual crewmembers. The most frequent comment received from the crew was that the quality of life was superior as a smoker due to the smoke breaks afforded them.

Individuals were identified as smokers only if they had been eyewitness verified as having smoked at least one cigarette underway in the most recent month at sea. The average smoking rate was 34% overall (Table 1). Despite the variability in numbers between boats, there does appear to be a trend towards higher smoking rates among junior enlisted when the senior enlisted are smoking role models. Of note, the commanding officer of the boat with the highest smoking rate was himself a smoker while at sea. This data suggests that leadership can make a significant difference in smoking rates of individual submarines.

	boat #1	boat #2	boat #3	boat #4	boat #5
Officers	0%	12%	6%	19%	9%
E7-E9	10%	33%	53%	60%	39%
E1-E6	27%	36%	40%	47%	37%
Total	22%	34%	37%	45%	34%

Table 1

These rates are consistent with an East Coast survey performed in 1999.[11] It found that 39.5% of submariners in Norfolk, Virginia smoked cigarettes. They averaged 1.1 packs per day. Reasons for smoking included such responses as "USN endorses it" and "to fit in".

Significant variation in smoking policy was observed. On one boat the smoking area was temporarily moved adjacent to the supply office. The office remained in a smoke filled fog for the next two days, during which assigned personnel avoided their office as much as possible. On another boat the smokers complained that their new commanding officer, unlike their previous, would not allow them to smoke on the mess decks during poker night. My personal observation during at sea assist visits suggest that some non-smokers, by virtue of work or berthing locations, are at risk for significant exposure to second hand smoke despite the best efforts of the atmospheric cleansing equipment.

The data from one recent study confirmed that a subset of the crew are inhaling second hand smoke, even when the submarine crew on average may have minimal exposure. A metabolite of nicotine was measured in the urine of volunteers during ten-day embarkations on two 688-class submarines.[12] The average nicotine metabolite among non-smokers within the smoking compartment (defined as either forward or aft work stations) went up 65%, but remained below the threshold most experts consider indicative of second hand smoking. However, the nicotine metabolite in some non-smokers went up 1000%.[13] The amount of nicotine metabolite in some cases indicated exposure to significant amounts of passive smoke. Clearly, whether crewmembers recognize it or not, they are being exposed to secondhand smoke.

Smoke Adversely Impacts Our Mission

There is a continuing divergence of smoking permissibility between the Submarine Force and our country's public institutions. Our force remains a governmental organization that is exempted from stringent indoor workplace smoking laws. Sailors and their families trust that the Submarine Force places a high priority on protecting crew health. Over time the divergence from the mainstream might undermine this trust, impacting recruitment and retention goals. This divergence may affect the perception of the Submarine Force among the medical and legislative communities.

Historically, there are numerous examples of organizations that failed to follow the precautionary principle in regards to environmental exposures. An important lesson on long term consequences can be learned from the episode of tainted water at Camp Lejune, North Carolina. From 1980 to 1985 some base wells were kept open despite high levels of two likely cancer-causing chemicals. The decision was defended by the Marine Corps based on there being no enforceable drinking water standards at the time. Families did not find out about the contamination until 1999. Victims groups claimed that up to 200,000 people may have consumed tainted water. In 2004, while a U.S. senator called for congressional hearings, the Marine Corps appointed an investigative panel.[14] The take home message is that carcinogenic health concerns, if not appropriately managed proactively, are a long term liability to any organization.

On a more practical level, the health care costs associated with smoking are enormous. The Centers for Disease Control has estimated that in 1999 the health care and lost productivity costs attributable to smoking were $3,383 for each adult smoker in the U.S.[15] There are currently approximately 15,000 personnel who serve in submarines with an average male lifespan of over 70 years, the future health care costs for a force made up of 25-40% smokers reaches into the hundreds of millions of dollars. Each incremental improvement in our smoking rates will save millions.

The linkage of tobacco smoke to long-term health effects such as cancer and heart disease is not possible in our young active duty population. However, I did have sufficient numbers of mental health disqualifications to determine if an association with smoking existed. There is a recognized relationship between smoking and mental

health pathology.[16] Some experts point to a direct casual relationship, hypothesizing that tobacco chemicals act directly on the brain and result in mental health problems. Other experts argue that individuals with mental health problems may simply have characteristics that make them more likely to take up smoking. It has already been shown that prior cigarette smoking is associated with higher attrition in basic training and after one year in the Navy.[17]

I reviewed 127 enlisted submarine mental health disqualifications that I acted on since January 2005. Most service members were diagnosed with an adjustment disorder or depression. The percentage of cigarette smokers was 52%. When compared to the estimated percentage of smokers in the Submarine Force, this is a statistically significant elevation (Chi-square test p-value <0.01). This may indicate that the Submarine Force's accommodative smoking policy tends to attract individuals with a higher risk of attrition, and potential deleterious mental health effects of smoking impact mission readiness.

The Future

Smoke-free submarine fleets (both diesel and nuclear) have been successfully implemented in other countries. Although it is unknown when the U.S. Submarine Force will transition to smoke-free boats, it is clear that this transition should eventually happen. The recent U.S. Surgeon General's report reinforces the fact that attempts to mitigate the effects of secondhand smoke within the closed environment of the submarine will never reach an acceptable level. Elimination of workplace smoking will need to be implemented.

The amount of smoking restrictions will continue to rise at home and abroad over the next decade. Some of the more perceptive smokers tell me they live with a simmering anxiety, wondering when the inevitable submarine smoking ban will occur. As the Submarine Force diverges from mainstream culture there are clearly no winners. While individuals on the deck plate argue over their individual rights as smokers or non-smokers, medical and psychological costs will continue to accrue.

The submarine community should pay close attention to new secondhand smoking policies in the news. Increasingly restrictive laws are taking effect from small California towns to large South

American countries. The U.S. Submarine Force is rapidly becoming the odd man out. Perhaps the time has come to make a bold decision to protect our people from the harms of tobacco smoke. This is the single most effective action to improve the health of our people, reduce the long term health care costs for the Navy, and support a culture of wellness.

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THE FUTURE OF THE SUBMARINE'S SEA DENIAL MISSION

by Mr. Nader Elhefnawy

Mr. Elhefnawy is a frequent contributor to the pages of THE SUBMARINE REVIEW.

In this era of rapid technological and political transformation, the submariner's primary mission has also seen rapid change. Traditionally, the sub's central mission was to sink shipping, denying the use of the seas to the enemy. In this the submarine was disadvantaged against surface ships and aircraft in many ways. Until the nuclear age surface ships were much swifter than subs, and aircraft are of course far swifter than both. Surface ships have fewer constraints on their payloads. Both ships and aircraft are superior to subs in their connectivity, their ability to tie into networks to pull off coordinated strikes, and they are more easily resupplied after they have expended their ammunition.

The submarine's redeeming virtue was its stealth, which let disadvantaged navies operate in waters dominated by an opponent stronger on the surface. For that reason the modern submarine began as a way for inferior forces to contest the naval supremacy of the dominant powers, be it the American TURTLE in the Revolutionary War, the Confederate HUNLEY in the Civil War or John Phillip Holland's early experiments, subsidized by the Fenian Brotherhood.

In a more developed form it enabled the Germans to try to strangle British shipping in the world wars; the United States to do the same against Japan in the western Pacific and its home waters during World War II; and the Soviet Union to threaten the lifeline between the United States and Europe in the event the Cold War turned hot.

The Submarine's capability to perform that mission has only continued growing since then. Air-independent propulsion systems give even diesel boats long endurance while submerged, and indeed, may let them lie quietly on the bottom in wait for surface ships to pass overhead as they play underwater *sniper*. At the same time developments like supercavitating torpedoes and the widening use of anti-ship and land-attack missiles aboard submarines increase their striking power.

That increased capability, however, seems unlikely to find its primary use in the anti-shipping mission. The major navies can accomplish the anti-shipping more effectively with other systems because of the capabilities of their air forces and surface fleets, and the weakness of their most likely opponents in the same areas. For that reason, they increasingly point to the sub's usefulness in gathering intelligence, supporting special-operations forces and launching land-attack cruise missiles.

Of course, this is not necessarily the case with Third World navies, which today operate hundreds of submarines. Jobs like inserting special operations forces or launching land-attack cruise missiles can be done by systems other than submarines, and more cheaply. While richer navies like those of the United States or Britain can weigh the pros and cons of using subs in these roles, countries with more limited means, and a more regional orientation, are bound to find such approaches not worth the cost. At the same time they can not count on air and surface power to fulfill the sea denial mission the way the United States and its major allies can.[1] This means that the future of the submarine as an instrument of sea denial will be most evident in the uses to which smaller and poorer navies put them.

Third World Submarine Forces and the Sea Denial Mission

Third World navies are typically outfitted to fight comparable opponents, which may suggest that their situations will resemble smaller-scale versions of the major twentieth century conflicts. This line of thinking certainly has some validity. To find a real-world analog to the mechanized, naval and air battles of the world wars, historians generally look to conflicts like the Arab-Israeli Wars (especially 1967 and 1973), the Indo-Pakistani Wars (particularly 1965 and 1971), the Iran-Iraq War (1980-1988) and recent wars in sub-Saharan Africa (like Ethiopia-Eritrea).

Futurists, equally, point to such scenarios when looking for the next conventional war. Where large-scale submarine action aimed at denying an enemy the seas is concerned, a conflict in the Straight of Formosa, with China attempting to use its submarine force in a blockade against Taiwan, is perhaps the most likely one. Even under

the most optimal circumstances (the commitment of every operational sub to the theater, the use by every submarine of its entire payload, etc.), however, China's Submarine Force can impose only limited costs on Taiwan, well below what would be required to force its capitulation.[2] China's Submarine Force is modernizing, but likely to shrink in size as it sloughs off its large number of obsolete Romeo-class vessels, and replaces them with fewer, costlier vessels of the Kilo and other classes.[3] As a result, the balance of power between China and Taiwan is unlikely to change dramatically in the foreseeable future because of any planned changes to China's Submarine Force.

At the same time, it is difficult to picture any other, comparable contest turning out differently. North Korea, for instance, has some two dozen submarines, and could conceivably use them to blockade South Korean ports, but its obsolescent (and perhaps largely unserviceable) force would have virtually no chance of success, even without American intervention. Iran's three Kilo-class submarines would accomplish less than that in an attempt to block the Strait of Hormuz, even allowing for the difficulty of anti-submarine operations in that area.[4]

In short, the quality and quantity of Third World submarines is severely limited by their economic and technological disadvantages. Even a Kilo-class sub, at over $200 million a copy, to say nothing of lifelong operating costs, is far from being a *cheap* alternative. Keeping even one operational at any given time will mean buying at least two such boats. Moreover even nations like China and India have had difficulty constructing indigenous submarines of any type, with nuclear subs, which can carry a price tag in the billions, taxing their industrial capability to and beyond its limits.

As a result, virtually any sea denial strategy such a navy pursues would have to be highly asymmetrical. At its simplest, the fact is that the well-publicized sinking of even a single ship can have highly disruptive effects on the movement of shipping, and compel a diversion of naval assets that might have been used in other ways. Nonetheless, as the Tanker War of the 1980s demonstrated, such an approach can only go so far. Tanker traffic continued through the Persian Gulf despite a very large toll in damaged and sunken ships. The political backlash from an attempt to interfere with the freedom

of the seas can also be disastrous, as Germany found in World War I, and as also became a factor in the Iran-Iraq War.

Indeed small Submarine Forces might do best to ignore civilian targets and concentrate on naval ones. The successes of Germany's small U-boat force at the start of World War II, like the U-47's sinking of the battleship ROYAL OAK, were generally of this kind.[5] The most likely mission of the Soviet Union's rather larger Cold War-era Submarine Force in the event of a conflict in Europe would, similarly, have been to cut off the flow of military reinforcements to the battle zone. They might, for instance, be dedicated to a *carrier-killer* mission, long a concern for American planners.[6]

Alternatively, such submarine forces would have to play a supporting role to other, simultaneous approaches, rather than being in the lead as they were in Germany's case in World War II, and the Soviet Union's in the Cold War. A China, Iran or North Korea, as a practical matter, would have to depend more on other assets in any presently plausible situation.

Alternative Approaches

Navies large and small have a whole host of anti-shipping, sea denial options, in areas where an opposing navy controls the surface, that do not require submarines at all—in other words, to accomplish the submarine's traditional mission without submarines. Four of these will be discussed here.

The first is the use of stealthy surface vessels and aircraft, other systems which capitalize on the sub's defining trait. Of course, even small warships are large enough targets that they are very difficult to make *stealthy*. Nonetheless relatively small, perhaps semi-submerged warships, would offer some capability. The demonstrated capabilities of stealth aircraft speak for themselves (provided that their bases can be kept operating), and this technology is already beginning to proliferate. In its Medium Combat Aircraft even India aspires to an indigenously built stealth bomber.

The second possibility is a variant on one widely mentioned concern, namely the risk that terrorists, rogue states or other parties might use freighters as launchers for crude cruise missiles. Such ships could also be used as platforms for anti-ship missile launchers (or mine-laying), in the manner of armed merchant ships or *Q*

vessels in earlier periods.

The third is a dependence on the use of long-range land-based missiles, cruise and ballistic, both against shipping, and against port facilities, possibly from concealed or buried launchers not easily identified by space surveillance, or immediately susceptible to air attack. Observers convinced of China's ability to blockade Taiwan are more likely to point to the country's massing of ballistic missiles on its side of the straits than it submarines as a potentially decisive factor.[7]

Finally, they could use special-operations forces against an opponent's harbors and naval bases, infiltrating them through routes other than a sub would take to do the same job. They might sink warships and civilian vessels in port, as well as attacking the shore facilities ships need to load and unload their cargo. Should they attempt to explode an oil tanker or liquefied natural gas carrier inside the port, the result could be equivalent to a massive air attack. While the main attention has been paid to the ability of terrorists to stage such attacks, a large, national special-operations force, such as North Korea's, would be much more capable of such an ambitious operation.[8]

Given this situation, in which Submarine Forces of the kind they can afford are inadequate to a serious sea denial mission even as other, cheaper weapons and tactics seem to hold real promise, it is not surprising that even smaller navies are looking to other missions for their subs. Israel, India and North Korea may be looking to use their subs as a sea-based nuclear deterrent by equipping them with cruise or ballistic missiles, as the five members of the United Nations' Security Council have long done.[9]

Conclusions

The submarine began its life as a weapon with which weak naval forces could fight stronger ones. Today, however, submarine advocates reasonably claim that the submarine is today's capital ship. Possession of a militarily capable force of capital ships is now more than ever a mark of being a great power, at sea as in other areas, of being that stronger fleet, and the submarine's traditional relevance may be declining accordingly.[10]

While this has to some extent always been the case—the notable

submarine users of the twentieth century all having been great industrial powers capable of deploying large numbers of boats—this is now the case even more than before. This is not to say, of course, that the use of subs in the anti-shipping role on the scale seen in the world wars is entirely out of the question. Rather, it is to say that this is something that only a large peer competitor such as Germany in the world wars or the Soviet Union in the Cold War can seriously attempt, even if only a regional level, and there is presently no such player. Many experts believe that in the future, China might combine both the means and the political will to do so, though only time will tell.[1]

Apart from this, submarines are likely to find themselves increasingly used in niche, asymmetrical or supporting roles, in smaller and poorer navies as well as the wealthier ones finding themselves without traditional challengers. Even allowing for matters of prestige and bureaucratic politics, the attractiveness of the submarine in those roles will be critical in determining the degree to which navies large and small continue investing in them to the degree that they have in the past.

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5. Germany began World War II with fewer than sixty subs, only twenty-two of them operational. However, Germany's anti-shipping campaign only really gathered steam after substantially boosting those numbers with a rapid construction program that at its height in 1943 turned out three hundred boats in a year's time. Edward P. Von Der Porten, *The German Navy in World War Two*. New York: Ballantine Books, 1969.

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7. Justin Bernier and Stuart Gold, "China's Closing Window of Opportunity," *Naval War College Review*, Summer 2003, vol. 56.3.

8. Mini-subs such as North Korea's special forces use would of course be an asset, but they are a far cry from full-sized attack subs. Additionally, even in making underwater approaches, it is conceivable they could use personal submarines, like those being marketed for recreational use.

9. Nader Elhefnawy, "Submarines and WMD Proliferation," *The Submarine Review*, Oct. 2004, pp. 89-95. Another, somewhat more futuristic possibility is the use of submarines as platforms for anti-satellite weapons. These could include both directed-energy weapons and missiles capable of lifting anti-satellite payloads into space, the latter an option that the U.S. had explored in the 1970s with its Poseidon missiles. Elhefnawy, "Submarines and Space Power II," *The Submarine Review*, Jan. 2004.

10. One recalls how Germany's and Britain's dearly purchased fleets of dreadnought battleships largely sat out the world war that their construction helped to start.

11. Lyle Goldstein and William Murray, "Undersea Dragons: China's Maturing Submarine Force," *International Security*, Spring 2004, vol. 28.4, pp. 161-196.

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SINKING A GALLANT PRESIDENT

by C. "Mike" Carmody, ENC(SS)(DV), USN(Ret)

Mike Carmody enlisted in the Navy December, 1941 at the age of 17. He never went to Submarine School. During World War II he made 11 war patrols as a machinist mate. He rates the submarine Combat Pin with 4 bronze stars. He also made peacetime Cold War patrols. He was Chief of the Boat on DIABLO (SS479). He is a hard hat diver second class and was a scuba instructor at the Escape Training Tank New London, Sub Base. He retired after 22 years active duty. He has had over 15 true stories published to date.

In September, 1940 I was employed by a shipping company located in lower Manhattan, New York. The job entailed getting ships *Bill of Ladings* passed by the U.S. Customs House. Customs would only pass cargo that couldn't be used as war material. This was a time when Germany was saber rattling in Europe.

A cargo ship was being delayed from sailing because of some doubtful cargo it was carrying. Customs eventually approved the ship's *Bill of Ladings*. It was the shipping company's responsibility to deliver the necessary paperwork to the ship. My boss instructed me to hand deliver the paperwork so the ship could sail on the morning tide.

The ship was docked at Pier 44 on the Hudson River. When I arrived, I was amazed at its enormous size. I climbed the forty foot gangway leading to the Quarterdeck. A seaman instructed me to stand fast while he went to fetch the ship's First Mate. While waiting, I read the inscription on the bulkhead plaque. It identified the ship as SS WOLVERINE STATE, a 540 foot passenger cargo ship, with a displacement of 10,600 tons. She was owned by the U.S. Dollar Line and was constructed in New Jersey in 1921.

The First Mate appeared in his impressive blue uniform. He signed for the manifest and thanked me for getting it to him. He told me their next port of call was Hamburg, Germany. Little did I know

then, through a sequence of events, I would come in contact with this ship again. It would be four years later and 12,000 miles from where I was standing. The results of the next encounter with this ship would prove to be disastrous. Information pertaining to this story was uncovered after World War II through Merchant Marine transcripts, and interviews of some of the 600 allied POW survivors rescued at sea by the U.S. submarine, PAMPANITO. Statements were later taken from many of the survivors liberated from Japanese prison camps. This information, along with my personal war time experiences, assisted me in writing this saga.

In December, 1940, the SS WOLVERINE STATE was sold to the American President Lines and renamed the SS PRESIDENT HARRISON. She was transferred to the Pacific routes under the command of Master Orel Pierson. In January, 1941, she sailed out of Philippines and China ports. A few months prior to the Japanese attack on Pearl Harbor, Hawaii, the SS PRESIDENT HARRISON was chartered by the U.S. Navy. Her new job description was to transport Navy and Marine personnel from cities in China and deliver them to the Philippines.

In late October, 1941, SS PRESIDENT HARRISON departed from Manila, Philippine Islands, with orders from the Navy, to proceed to a Hong Kong shipyard, where she was to be converted into a troop transport ship. After completion, the President Harrison was ordered to Shanghai to evacuate three hundred men and equipment of the 4th Marine Division and Peking and Tientsin Legation Guard. They were to be transported to Manila.

PRESIDENT HARRISON and her crew of 155 men departed Hong Kong en route to Shanghai. The voyage was to be a secret. Unfortunately, the enemy knew of her destination and that contributed to her capture by a Japanese destroyer. The Destroyer's captain told Captain Pierson he knew of all his ship's movements. He said the HARRISON's itinerary was the talk in every bar and hotel in Manila and Shanghai.

The following is an excerpt from Master Pierson's official report: "On the morning of December 7th we were at sea on the north side the Yangtze Estuary. At 0330 a.m. I received a radio message from Cavite Naval Base, Philippine Islands, stating that Pearl Harbor, Hawaii had been attacked by the Japanese, "The show was on."

HARRISON was now completely outfitted for the carriage of troops and, if captured, could have been loaded and used within a matter of hours against our forces in the Far East. I was bound and determined to use every means in my power to prevent this. After informing the officers and crew as to what was happening, we immediately painted the stack and superstructure with gray paint. We were trying to hide our identity if we met up with any Japanese vessels.

"At daylight, a Japanese plane, with bomb racks full, signaled us to stop with a burst of machine gun fire. Then, NAGASAKI MARU, a fast 22 knot Japanese Mail Carrier, appeared and started to trail us. I tried ramming him, but she was smart enough to keep well clear of us, while still keeping guard over us. I then planned to run up on the beach of nearby Shaweiskan Island. I conceived the idea of ripping the Harrison's bottom out completely. If I should achieve this, the vessel would go down and be a total loss.

"As we approached the island, a Japanese destroyer came into sight, making for us at full speed. He did not open fire, the reason I learned later, they wanted the ship intact. It became a race as to whether we could make the island before the destroyer could intercept us. Minutes before we struck the island I ordered the engineers out of the engine room. I told them to leave the plant running wide open. Making sixteen knots, we struck the edge of the island on our port side. We rode along the island's edge for a considerable distance, and then rolled off. We had ripped a hole 90 feet long. Unfortunately, the gash didn't reach to the engine room spaces. Now, the plane opened up on us again, presumably, to stop us from using the radio. The ship almost turned over on her side, but she righted herself. She was then carried off the rocks by the strong currents and settled on a mud bank. The order was given to abandon ship. One lifeboat, before it could be pushed away from the hull, was caught by the swift current and wind. The ship's exposed turning propeller split the lifeboat in half, killing three men and severely injuring many others. A Japanese landing party then stormed aboard our vessel and ordered all personnel in the lifeboats to return to the ship. The crew spent the next forty days aboard while sufficient repairs were made to enable us captives to take her to Shanghai. There the entire crew was interned in a Prisoner of War Camp." This was the end of Captain Pierson's report.

There was a woman crew member onboard the PRESIDENT HARRISON. She was Mrs. Clara Main, a stewardess, the first American woman to become a Japanese prisoner of war. After the war she received the Meritorious Service Medal for her dedication to duty, under fire, and for tending to the injured crew members for 40 days. Her actions saved many from dying.

Master Orel Pierson was lucky to survive the war. Twice, he came close to being executed for attempting to scuttle his ship.

The Japanese renamed PRESIDENT HARRISON KACHIDOKI MARU. For two years and eight months she made numerous voyages transporting Japanese troops and transporting raw material, confiscated from captured territories, to Japan.

On a hill, overlooking Pearl Harbor, Hawaii, there was a building surrounded by a barbed wire fence and patrolled by armed Marines. Very few people knew of the building's real purpose. A sign affixed to the building with the letters FRUPAC was its only means of identification. It stood for Fleet Radio Unit, Pacific. It housed the Navy's Japanese code breakers. One branch of FRUPAC was responsible for breaking H25, the Japanese Merchant Marine code used for convoy movements.

In early September, 1944 the code people intercepted and decoded a transmission relating to a convoy movement from Singapore to Japan. Its code name was HI-72, and was scheduled to depart Singapore on 6 September 1944. The information was dispatched, however, no mention was made that two ships, within the convoy, would be transporting 2,218 prisoners of war, more than 300 wounded Japanese soldiers and thousands of Japanese officials and their families, fleeing South East Asia.

On 4 September 1944, KACHIDOKI MARU was being loaded at a Singapore dock with raw rubber and bauxite. She was scheduled to sail with convoy HI-72 on 6 September 1944. She was one of several ships being readied for the voyage. Waiting to board, were half of the 2,218 prisoners of war, needed by Japan, to be used as slave labor. They were selected from the River Kwai area of Rangoon. They were each given a 25 pound cube of rubber to be used as a flotation device. Everyone doubted the cubes would be able to support a man in the water. They concluded it was just a clever way of cramming more raw rubber onto the ship. In addition,

every ship had a large number of Japanese civilians onboard.

On the morning of 6 September 1944, at 0700 hours, the convoy departed Singapore en route to Japan. It merged with another convoy from the Philippines on the morning of 11 September 1944. It numbered 15 ships, including 5 destroyer escorts. Messages were dispatched daily, giving the exact location of the convoy.

Tension within the convoy heightened as it entered the center of the South China Sea. For they knew they were outside air cover range and knowingly entering U.S. submarine hunting grounds. Lookouts were tripled and guns were manned around the clock.

Admiral Nimitz's submarine staff was plotting the convoy's course. Three submarines patrolling in the South China Sea were alerted, USS GROWLER (SS215), USS SEA LION II (SS315) and my submarine, USS PAMPANITO (SS383).

PAMPANITO's position was the furthest north, near the Formosa Strait. At 1200 hours, 12 September 1944, seven ships had been sunk, including the Japanese destroyer, SHIKINAMI. This is where my sequence of events comes into play.

At 2210 hours PAMPANITO approached the convoy on the surface with a perfect attack situation. A torpedo in the number four torpedo tube moved forward against the closed outer door and began running. It was now armed and could explode by any kind of a jolt. The attack was aborted in order to disengage a jammed gyro setter. Our Captain, Peter Summers, decided to press the attack and not lose our advantage.

The following was taken from PAMANITO's official log, written by Captain Summers, in his exact words: "We bored in on the surface at flank speed. At 2240 hours we fired five torpedoes from the forward tubes. Three targeted for a large transport (AP) and two at a large freighter (AK). Swung hard right and at 2243 fired four stern torpedoes. Two at each of the two ships in the farthest column—Saw three hits in large transport, two hits in large freighter, (targets no.1 and no. 2) and one hit in tanker (AO) farthest column, heard and timed hit in fourth (AK) the leading ship also in farthest column. In all seven torpedo hits out of nine fired. From the bridge we watched both the large (AP) and large (AK) one with two hits sinking. We also saw the after deck house on the (AO) in which we saw one hit go up in the air with the ship smoking heavily. The

fourth ship could not be observed because of the smoke. A short interval after the seven torpedo hits the escorts started dropping depth charges and firing in USS PAMPANITO's direction.

When I read Master Pierson's post war official maritime report about the capture of SS PRESIDENT HARRISON, he mentioned the ship was originally the SS WOLVERINE STATE, the same ship that impressed me as a sixteen year old delivery boy.

On the night of 12 September 1944 when USS PAMPANITO sank the KACHIDOKI MARU, previously named SS WOLVERINE STATE and SS PRESIDENT HARRISON, it was four years and exactly 12,000 miles from Pier 44, Manhattan, New York, that I stood on her quarterdeck in 1940.

After taking three torpedo hits, this gallant ship, slipped beneath the sea in less than twenty minutes. Sadly, post war records revealed 350 allied prisoners of war, 450 Japanese civilians and 300 badly wounded Japanese soldiers, went down with her. Post war records also revealed that Japanese rescue vessels from Hainan Island rescued many survivors the following day, including 656 prisoners of war. This ends the history and loss of a gallant President.■

SUBMARINE NEWS FROM AROUND THE WORLD

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From the July 2006 Issue

TURKEY-Naval Priorities

Press reporting in July 2006 reaffirmed Turkey's naval priorities for the next several decades. Sources indicate that the three highest priorities remain the MILGEM Corvette Program, the Future Submarine Program and the modernization of the four Atilay class submarines. These three programs are in various stages of procurement activity with major decisions expected by the end of 2006.

In regard to the MILGEM Corvette Program, a Request for Proposal (RfP) for the MILGEM "Patrol and ASW Ship" Project was originally released in May of 2000. However, none of the subsequent bids were selected due to delays in the program associated with defense spending that started in 1999 and continued through 2004. In early July 2005, the Turkish Undersecretariat for Defense Industries (SSM) re-issued an RfP for the design of the prototype corvette. Responses to the RfP were due back to the SSM by 28 October 2005. An announcement of the design winner is expected by the end of 2006.

A single prototype could begin construction at Istanbul Naval Shipyard by 2007 with commissioning occurring in 2011. Following extensive testing, an additional eleven units of the class are expected to be built under the US$2.4B program. The follow-on units will be built at several private yards in Turkey.

The Future Submarine Program continues to move forward under the auspicies of the New Type Submarine Project (AMI Project Report Future AIP Submarine dated January 2006). On 29 March 2006, the Turkish SSM posted a Request for Information (RfI) for four new submarines to follow the Gur class, of which the final unit will be completed in 2007. The RfI was posted in order to gather administrative, financial and technical information from companies

who may be willing to participate in the program. Twenty five interested companies, including submarine builders, systems houses and service providers responded to the RfI (complete list is available on the SSM Website at http://www.ssm.gov.tr/ under the "Announcements Section").

Although this program is still in its preliminary stages, the New Type Submarine Project was initially envisioned in 1997, when Turkey issued an RfI for a new class of diesel submarines to follow the four units of the Preveze (Type 209/1400) class. Rather than move forward with a new class, the Turkish Navy decided to continue with four additional units of the Type 209/1400 (Gur class). At the time, the sea service determined that there was insufficient time and funding to evaluate and acquire a new submarine design while still keeping the Golcuk and Istanbul Shipyards fully employed building submarines and surface combatants. Now with the impending completion of the Gur class, the sea service is ready to move forward with a new class of submarines.

The Turkish Navy is also expected to begin a modernization program on the final four units of the Atilay class (BATIRAY, YILDIRAY, DOGANAY and DOLUNAY). Press reporting indicates that the sea service will sign a US$200M contract with Howaldtswerke Deutsche Werft (HDW) (now part of TyssenKrupp Marine) by November of this year in order to complete upgrades to the four units. Upgrades to the submarines include weapons and fire control systems, overhaul of diesel engines and electric motors, replacement of batteries, and the upgrade of the sonar suite and towed array.

Other priorities of the Navy include the procurement of two dock landing ships (LPDs), a submarine rescue mother ship, two rescue towing ships (see Article #2) and eight landing craft as well as fast patrol boats and attack craft for the special forces. However, some of these programs may be dependent on financing from the European Union (EU), of which Turkey is currently pressing for membership or additional funding by the SSM.

SOUTH KOREA - Naval Update

A. Future Frigate (FFX) Program to Start in 2008

On 13 July 2006, the Republic of Korea Navy (ROKN) selected

Hyundai Heavy Industries (HHI) as the preferred designer for the FFX program. Twenty-four units are now being planned for the FFX Program. The latest timeline for the FFX Program is as follows: Request for Proposals (RfPs) for construction will be issued to HHI in late 2006 or early 2007.

- A construction contract will be awarded in 2008.
- The first six units (Phase 1) will be built through 2015 with the first unit commissioning in 2011.
- Phase 2: Nine ships will be built from 2015 through 2023.
- Phase 3: Nine ships will be built from 2021 through 2028 completing the class at 24 units.

Preliminary designs indicate that the new frigates will be around 102 meters (334.6ft) in length displacing 2,300 tons (+/- 10%). They will have a maximum speed of 30 knots with a cruising speed of 18 knots. Sources indicate that the new frigates will have the following subsystems:

- Indigenous 3D radar similar to the SMART-S Mk2
- Two Ceros 200 multi-sensor directors
- Indigenous sonar
- Eight SSM-700K surface-to-surface missiles (SSMs)
- One RAM Launcher
- One 76mm gun
- One Korean CIWS
- Korean lightweight torpedoes

TAIWAN - US agrees to Two-Phase Approach for Submarine Program

Press reporting in July 2006 indicates that the US has agreed with a Taiwanese request for a two-phase procurement in order to help rescue the stalled submarine program. Sources indicate that the US is willing to divide the program into two phases; the design phase valued at around US$360M and the construction phase at US$3.64B. The two-phase approach was requested earlier in the year by the Taiwanese Defense Ministry and apparently has the backing of several US Congressional members (with apparent approval by the US Navy) as well as up to four potential US suppliers (shipbuilders and system houses).

The new avenue of utilizing two phases is an attempt by the Taiwanese Defense Ministry to gain support from the Taiwanese Parliament to fund the program in phases. This approach would allow Taiwan to commit only a relatively small portion of the overall funding during the planning and definition stages. However, the drawback is increased risk and costs that could develop in the follow-on phases.

Although interest still remains among four potential US suppliers including General Dynamics–Electric Boat (GD-EB), Northrop Grumman Ship Systems (NGSS), Lockheed Martin and Raytheon; unanswered questions, such as design and approval in the Taiwanese Parliament, apparently are still sticking points. In regard to design options, there appear to be several foreign designs that are being considered including the Navantia S80 and the TyssenKrupp Type 214 although there has been no final determination on whether the Spanish or German governments would allow these designs to be exported to Taiwan. It can also be assumed that other sources such as France, Netherlands and Russia would be considered under the foreign design option.

There is also some speculation that if the US could not gain access to a foreign design, it does have a modern design that has never been produced. This would be risky at best as the last diesel-electric submarine designed and built in the US was the Barbel class in the early 1950s.

Although the US and the Taiwanese Defense Ministry are still attempting to find creative ways to move this program forward, the bottom line is that both parties will need full cooperation from Taiwan's Parliament in regard to funding if the program is expected to begin phase one and more critically, the high cost of phase two. Since President Bush's 2001 arms package proposal, the Taiwanese Parliament and/or the Legislative National Defense Committee (LNDC) has shot down the entire arms package or portions of the package more than 40 times; although some progression has been made. With the Chinese Nationalist Party (KMT) and their allies now controlling the Taiwanese legislature, it is becoming increasingly more difficult for the Defense Ministry to move forward with the remaining portions of the arms package. The three major items that remain on the table with no firm funding line in place include

the eight submarines as well as 12 P-3 maritime aircraft and three PAC III missile batteries.

PAKISTAN–New Construction Entrant?

Reporting throughout July 2006 continues to show that Pakistan intends to become an exporter of submarines and surface ships. Statements by the Prime Minister and defense officials indicate that Pakistan has acquired the transfer of technology rights for the French Agosta class submarine. The Prime Minister admitted that any chance of construction for foreign clients would occur at a later date.

The same reporting also indicated that Pakistan may also already have the rights to market and sell the Chinese F22P frigate design. The F22P design is the new Pakistani frigate that will be built in China and Pakistan with the first unit beginning construction in 2007.

The Pakistani's have experience in building patrol vessels and fast attack craft and more recently the Agosta 90B class submarine with the assistance of the French. The latest endeavor will be the Chinese F22P frigate design, further expanding the capabilities of Karachi Shipbuilding & Engineering Works (KSEW).

There is no doubt that KSEW is slowly expanding its experience in all areas of naval construction and fully intends on entering the market. The question is; how much longer will it be before the shipyard can become proficient in the construction of major surface combatants and submarines and what market will Pakistan target?

Past reporting seems to indicate that KSEW fully intends on penetrating the Middle East and South Asian markets as it has made offers of submarines to the United Arab Emirates and Bangladesh. With lower indigenous construction costs compared to Europe and the US, Pakistan could be the low-end provider for navies with very limited budgets such as Bangladesh, Indonesia, Vietnam and the Philippines.

From the September 2006 Issue

THAILAND—Coup Effect on Mega Project

On 19 August 2006, Prime Minister Thaksin Shinawatra was deposed in a coup by Army General Sonthi Boonyaratglin. The Prime Minister was in New York for the United Nations (UN)

General Assembly when the coup occurred. The General is now head of the Thai Government and has formed a Democratic Reform Council to select a new Prime Minister over the next several weeks.

Although the situation remains stable and a new government will probably be formed over the coming months, what is uncertain concerning the Royal Thai Navy (RTN) is the continuation of Mega Project. Mega Project had the backing of Prime Minister Thaksin Shinawatra and is the ten-year procurement program of frigates, **submarines**, offshore patrol vessels (OPVs), amphibious ships (LPDs), aircraft and missiles. The frigates and OPVs were expected to start in the next several years although it is now uncertain if these two projects will move forward as well as the entire Mega Project program.

One thing is certain, nothing will move forward until a new Prime Minister is appointed, political stability is reestablished and all associated ripples (new military appointments as a result of the coup) within the military have been resolved.

PAKISTAN—Looking for Nuclear Submarine Fleet?

In mid-September 2006, AMI sources indicated that the Pakistani Navy (PN) is interested in acquiring a nuclear-powered submarine. Pakistan continues to be concerned about the Indian Navy (IN) and its leasing and operation of Russian submarines as well as it's attempts to design and build indigenous nuclear submarines from its Advanced Technology Vessel (ATV) program. Pakistan is also concerned about India's general support from the United States, France and Russia in this area of nuclear submarine development.

Pakistan is currently finishing up its Khalid class submarine program with the third and final unit to be commissioned in 2007. In addition, the PN is also considering the procurement of up to five additional submarines of the Marlin class from France. However, the PN understands the limits of conventional submarines and recognizes that if India is building its nuclear boats to advance its strategic goals, then Pakistan should follow suit as well.

Although recent press reports indicate that Pakistan has already acquired the capability of developing its own nuclear submarine, one must view these reports with extreme skepticism. As evidenced by

India's attempt to indigenously produce a nuclear-powered submarine that has taken well over a decade with assistance, one can assume that Pakistan will struggle with the same issues. The main issues are a modern nuclear submarine design, the adaptation and miniaturization of a nuclear reactor, the development of shipboard systems involved in the control and cooling of a submarine nuclear reactor, as well as an experienced yard capable of nuclear submarine construction. AMI believes that Pakistan, with a desire to acquire a nuclear submarine fleet, will face the same hurdles as India (and Brazil). In fact, Pakistan currently does not have any foreign assistance in these areas where India had Russian help in ship design and reactor assistance.

If Pakistan receives any foreign assistance, it will more than likely come from China, a major supplier for the Pakistani Armed Forces. It is not likely that Russia, the US or France will help Pakistan in such an endeavor with a modern hull, construction assistance in Pakistan and certainly not the miniaturization of a nuclear reactor.

Although Pakistan has the desire, it is probably decades away from acquiring nuclear-powered submarines but eventually will, due to its belief that it must match India on this front. If anything, Pakistan is in the very early stages of designing the concepts of a nuclear-powered submarine capability. Just completing the Khalid class, Pakistan's Karachi Shipbuilding & Engineering Works (KSEW) is still int eh very early stages of actually being able to build an entire hull in country. Building some or all of the Marlin class (assuming the program moves forward) will help, however, they would still require massive design and construction assistance from an outside source to build a nuclear submarine in country.

The issues concerning an adaptable reactor and the price for such a submarine program are entirely another matter. Both will be at the forefront of any future discussions concerning the development of such a submarine in Pakistan. However, it must be realized that similar to the Pakistani nuclear weapons program where the nation had a desire to match India's strategic capabilities, it was able to do so in the past suggesting that it will do so in the future.

NORWAY—Defense Study FS 07 Underway

In early 2006, the Norwegian Chief of Defense announced the commencement of its latest defense study, Defense Study 07 (FS 07). The study is being conducted at the Armed Forces Command (within the MoD) and is expected to form the blueprint of the armed forces from 2009 through 2012. FS 07 will submit its recommendation to the Chief of Defense by September 2007 and allow Parliament enough time to develop a new plan document for the spring of 2008.

The main focus will be to propose measures for attaining a permanent balance between tasks, structure and resources as well as to protect the operational structure and increase the efficiency of the support structure.

FS 07 is organized as a project team and will report to an advisory group appointed by the Chief of Defense. The Norwegian defense forces face considerable challenges in the future including budget shortfalls estimated from US$250-600M annually from 2006 through the indefinite future. This shortfall will come at a critical time as the armed force is completing its last round of reductions and reorganization with an eye on the future force beginning in 2009.

In regards to the Royal Norwegian Navy (RNoN), this time period is critical as the Fridtjof Nansen (F-100 design) class frigates and Skjold class fast attack craft (FAC) programs will be completing by 2009. Following the completion of these programs, the sea service was expected to begin a new submarine program in order to replace the six Ula class submarines built from 1989 through 1992.

In November 2005, the Norwegian Chief of Defense publicly stated the importance of acquiring a new submarine for the RNoN by 2020. However, with FS 07 looming, one can never be certain what the force structure will look like or what programs will be modified, delayed or cancelled as a result of the study.■

DISCUSSION

TOMORROW'S SUBMARINE OFFICER

by Captain R.A. Bowling, USN (Ret.), Ph.D.

In the July and October 2005 and July 2006 issues of *The Submarine Review*, Captain Bill Clautice, CDR Mike Bernacchi and CDR John Brons respectively agreed essentially that the fundamental cause of the grounding of *SAN FRANCISCO* was that "the rigid, methodical approach to nuclear engineering" has not been "applied to navigation" or simply put, ". . . our nuclear plant operators are being properly trained, but not our navigators" (Bernacchi 124; Clautice130). However, based on the material provided in this combined discussions alone, that appears to be too narrow a causation. The term *navigators* more properly should be expanded to encompass the entire field of *operations (OPS)* and probably even *weapons (WPNS)*. That is, primary emphasis on developing qualified nuclear power plant operators has been and obviously continues to be at the expense of developing equivalent stringent qualifications in OPS/WPNS from the outset of submarine officer-training at SUBSCOL (Clautice 127).

Specifically, initial submarine officer training consists of one year (52 weeks) undergoing "**rigid, methodical**" [emphasis added] nuclear training followed by ten (10) weeks of "**familiarization** [emphasis added] training on target motion analysis, periscopes and navigation equipment" in the Submarine Officer Basic Course (SOBC) at the SUBSCOL (Bernacchi 124; Clautice 128). Then it is off to their first boat where "all new Submarine Officers are expected to pass the engineer officer exam in their first sea tour" (Brons139). This initial, primary assignment to the engineering department undoubtedly takes priority over becoming a ***fully*** qualified O.O.D. underway, *e.g.*, Rules of the Road, Piloting, Emergency Bills, initial Diving Officer, and becoming at least somewhat more than familiar with the use of on board Operations equipment, *e.g.*, COMMS, NAV, Electronics, and Weapons systems. This hiatus from OPS/WPNS is further compounded by the fact that once an individual has become sufficiently trained *to be useful* in the

operation of the on board nuclear propulsion plant, "the officer is sent away for several months to engineer's school to be prepared for the Naval Reactors examination." Only after passing that exam are they "sent forward" to commence serious training in OPS/WPS (Brons139).

And yet, all three offer as a solution essentially more of the same basic policy that all "officers who command nuclear powered warships [are] expected to be nuclear trained" (Bernacchi 119). Additionally, CDR Bernacchi recommends a "*nuclear trained* approach to navigation procedures" (Bernacchi 124). Which is fine, except that as previously noted, the problem is not limited to navigation alone. And in any case, the benefits gained in overall navigation prowness in the force would be largely vitiated later by detailing these "*nuclear* trained" navigators to the Line Locker at Naval Rectors where "half the senior officers [are] filled by non-ENGs" instead of rotating them back as instructors or managers in OPS/WPNS training programs (Bernacchi 121). Captain Clautice suspects that although "our COs are much better trained in engineering than navigation.... the best path to nuclear submarine command is still through engineering assignments" (Clautice 130). However, he tempered this with the observation that assigning "top performing officers . . . as Engineer Officers . . . should be evaluated and if [continued], [should] be compensated for by even more emphasis on safe navigation training and practices" (Clautice 130). On the other hand, CDR Brons decries an apparent bias against Engineering Officers (31 percent) in a recent PCO class and suggested that "selection to XO and CO should be available to all officers . . . in all jobs" (Brons 141). Considering just three major departments, OPS/WPNS/ENG, that appears to be a fairly even split.

Significantly, however, his comments reveal the negative consequences of "rotating division officers into and within the [ENG] department" which results in a situation in which "today's ENG does not have the benefit of long term, highly experienced division officers supporting him in the management of the department" (Brons 139).This inefficient management situation is compounded by the practice of having the ENG "serving as one of the preferred forward watch officers as well", ostensibly to maintain and extend his experience in OPS (Brons 140). In which case, both

engineering and operations get less than maximum support from such a single individual. For "no servant can serve two masters"; if he tries, dedication to both will suffer. There has to be a better way.

A clue to a better overall solution was offered by CDR Bernacchi's observation that "our rigid, methodical approach to nuclear engineering can pay HUGE benefits **IF** [emphasis added] applied to navigation" (124). Although it has been introduced in several specific cases such as the SCC, the *new* PCO course and the SOAC course, it has not been fully implemented across the entire operations spectrum (Bernacchi 122-23). And for a valid reason, "there are only so many hours in the day" as noted by Captain Lotring (Clautice 129). That reality cannot be changed, but those hours can be divided into two separate tracks, ENG and OPS/WPNS. And therein lies the optimum solution to maximum engineering and operational readiness.

To achieve that goal within an unalterable fixed time and a variable number of new submarine officer accessions, it will be necessary to change the way we train submarine officers, both initially and progressively during their careers. First and foremost, establish a policy of training new accessions along two separate tracks: ENG or OPS/WPNS. Then revamp the Submarine Officer Basic Course (SOBC) accordingly.

All of the subjects and skills that are covered by the material in the Junior Officer Courses, including the use of virtual reality ship handling trainers (VESUB) and Submarine Piloting and Shiphandling Trainers (SPAN 2000) now required by all officers during their first year on board, could and should be instilled during their Submarine Officer Basic Course (SOBC) (Clautice 129). Similarly, many subjects and skills covered in the SOAC, *e.g.*, shiphandling and navigation (surfaced and submerged) for department heads could and should be instilled during the SOBC (Clautice 129; Bernacchi 123). Then the Senior Command Course (SCC) and the PCO course could concentrate on the higher levels of knowledge demanded of COs in the C^4ISR spectrum. Concurrent with this revision of the SOBC, elevate the training standards to those equivalent to the rigid standards imposed in the nuclear power training program.

Execution of this policy would have officers electing or

selected to be Engineering Officers proceeding directly to nuclear power training facilities. Upon completion of that initial training, they would receive *at the same facility* a one to two week course on basic submarine operations surfaced and submerged, presented by an instructor from the SOBC (TAD). Then, off to their first boats where they would remain in engineering as a career path.

Officers electing or selected to specialize in OPS/WPNS would receive a similarly rigid training in those disciplines in the SOBC at SUBSCOL. Upon completion, they would receive *at the SUBSCOL* a one to two week indoctrination in the capabilities, limitations, and safety measures associated with nuclear power plants. Then, off to their boats where in very short order they should become qualified O.O.Ds and contributing members to the OPS/WPNS departments where they will remain as a career path.

There are obvious advantages and disadvantages to this radical departure from the current policy that all submarine officers must be nuclear trained. But given the admitted shortcomings in current OPS training and performance, there can be no doubt but that specializing in OPS/WPNS by "*nuclear [type] trained*" officers can only result in "HUGE benefits" (Bernacchi 124). The ENG community would also benefit, primarily by the elimination of the current policy of rotating all officers through the engineering department resulting in the paucity of experienced division officers therein. And cost-wise is should be at least neutral: a reduction in the number of officers undergoing nuclear power training would be balanced by an increase in the number undergoing specialized training on sophisticated trainers (VESUB, SPAN 2000).

In brief, this two track method of training future submarine officers would result in our submarines being manned by an officer cadre possessing specialized skills in both engineering and operations. And thereby, best ready to carry out the *raison d'etre* of all warships: to close — superior mobility, ENG/OPS — and defeat — superior combat readiness, OPS/WPNS— the enemy at sea.■

SCHEDULE VS. QUALITY

by Capt. David G. Smith, USN(Ret)

In the April 2006 issue of THE SUBMARINE REVIEW, page 143-5, Rear Admiral Ray Jones reviews the book *Silent Steel, The Mysterious Death of the Nuclear Sub USS SCORPION.* Jones avers the "book fails to reflect the strong safety culture of the entire Submarine Force ..." Commenting on author Stephen Johnson's assertion that there was a "culture of audaciousness that permeated the Submarine Force," Jones claims "in my 34-year naval career in submarines I never once experienced such a culture."

Speaking from the experience of my own Submarine Force career, I would side with Johnson's characterization rather than that of Jones. All too often, the established priorities were on schedule over safety. In fact, the culture within the sub force during the 1960-1980 time-frame was not unlike that within NASA that contributed directly to the loss of Challenger and Columbia (http://www.space.com/missionlaunches/caib_report_030826.html

The report of the spacecraft accident comments that "resource and schedule strains ... compromised the principles of a high-risk technology organization." "The measure of NASA's success became how much costs were reduced and how efficiently the schedule was met." And in a further comment the report states that the "causes of (the shuttle) accident are rooted in the space shuttle program's history and culture, including ... schedule pressures."

In my experience, these descriptions of the space program could just as easily apply to the Submarine Force during the period that includes the loss of SCORPION. In fact, I would invite interested readers to Jon Howe's article *Polaris Duty: Pinnacle or Predicament?* in the August 1967 issue of U.S. Naval Institute Proceedings. The article clearly details the concerns felt by many as a result of the culture established by the senior officers. It comments on the *unnecessary requirements and restrictions* and in some instances the absence of *the element of common sense.* The article concludes with the comment that "the Navy must strive to use the full potential of its people and to prevent newly developing programs from becoming unnecessary endurance contests of dedication." It reminds me of a

classmate who recently conveyed that his decision to leave the navy was finalized when, on receiving orders, he considered the comment of his daughter who reminded him that she had been a new student in a different school in six of the previous eight years.

The endurance contests of dedication resulted from the driving goal of meeting the schedule with little concern for the impact on personnel. Thus one could ask, were the Submarine Force personnel being managed primarily by operating schedule concerns, without appropriate consideration for the development of quality personnel?

As for the issue of material safety, when presented with a choice between quality and schedule, it was not uncommon for senior officers in SubLant to place schedule above quality in making operational decisions. For those readers who might object to that statement, here are two cases in point:

First example: In 1972, USS JACK was in refit with crew and tender personnel undertaking significant repairs. The Division Commander, acting for SubLant, shortened the refit period and directed the ship get underway for the Med ahead of the originally scheduled date. As Commanding Officer I objected to the demands that would be placed on the crew to meet such a schedule (needing to work nights and weekends to complete essential repairs, with the possibility that all necessary repairs could not be made) and requested more time to complete all maintenance. I was directed to get the ship underway on schedule.

Second example: I took command of USS HOLLAND in mid-overhaul at Puget Sound Naval Shipyard. It was soon apparent that insufficient manpower and funding had been allocated to complete all the necessary repairs to the ship. The situation was presented to the SubLant Chief of Staff who had little sympathy for the situation. The Chief of Staff was asked specifically "Do you want the ship repaired properly, or do you want us to leave the shipyard on schedule?" His reply was "Leave the shipyard on schedule."

These instances reflect insufficient appreciation for safety considerations and the potential hazardous impact on material condition, repair personnel and crew. In the above examples, an effort was not made to investigate or evaluate the recommendations of the Commanding Officer in order to weigh the detailed facts, thus to ensure safety was not compromised. They also support the

comments of Mark A Bradley, published in the July 1998 Proceedings: *Why They Called the SCORPION "Scrapiron*." In that article he reviews the history of SCORPION and notes that just over a year prior to her loss she completed the *cheapest submarine overhaul in U.S. Naval history* as a result of management decisions to limit work. He also comments that the most likely cause of SCORPION's demise was *the Navy's failure to absorb the lessons learned from the THRESHER*."

Although the establishment of the SUBSAFE program made dramatic improvements in the material condition of our submarines, it remains essential that those responsible for the management of high-risk operations ensure a culture that places quality above schedule when critical decisions are made. The safety of life depends on it. Fortunately, for most of the time the Submarine Force was lucky.■

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THE SUBMARINE COMMUNITY

COLD WAR BABIES

by Mr. David Randall Hinkle

Dave Hinkle is a retired submarine officer. He qualified in CAVALLA (SSK244), one of the first of the ASW boats. He was commissioning Sonar Officer of TULLIBEE, Operations Officer of HADDO, Executive Officer of PLUNGER and Commanding Officer of PARGO. After retirement from Active Duty and graduation from Law School he founded and ran Sonalysts, Inc. in Waterford, CT.

For four decades the Soviet Union and the United States faced off in what is now referred to as the COLD WAR. The standoff was waged night and day, seven days a week, three hundred sixty-five days a year. For years on end, the planet was minutes away from an Armageddon. Thousands of nuclear weapons, each with the explosive power to destroy any city on the globe, were ready for launch in minutes. It is to the everlasting credit of both the Russians and Americans that the struggle ended without resorting to nuclear warfare. But, a price was paid by those who served their country on the front lines and also by their families.

The U.S. Navy played a major role in the conflict. Nuclear ballistic missile submarines carried the weapons that could not be stopped by any aggressor. No country could launch nuclear weapons at the U.S. and survive. Counter attack was certain as our quiet, nuclear, ballistic missile submarines roamed the seas undetected. Nuclear attack submarines, with superior sonar and quieting, were able to find and dog foreign submarines undetected. Thus, no enemy could be certain their missile-firing submarines would survive to launch weapons if a conflict escalated to open warfare.

Submarines manned the front lines around the world for decades. The world little knows nor appreciates the enormous effort made by the men manning the front line boats for all those years.

Months at sea, never enough sleep, operating the most complex vehicle ever devised by man in the most hazardous environment known to man, became routine. Continuous sea duty was the norm, and shore assignments, generally in precommissioning units, were so demanding that it was a relief to be sent to sea. There was little time for family and therein lies the equal sacrifice paid by the submarine families. I tell the story of the birth of my three daughters to illustrate the toll the Cold War took on submarine families and particularly our wives.

My daughter Valerie was born on 28 November 1956. I had been at sea almost continuously since July of that year but expected to return to New London from North Sea operations the second week in November. The projected baby launch date was the fourth week in November, which was a comfort for both Muriel and me, because I was scheduled to be home on leave to take care of Muriel when the baby was born.

The Suez War intervened and changed all plans. Submarines manned the barriers. None of us, at sea or at home, had any idea of when we would return to port. Muriel did not even know we would not be returning as scheduled until after we failed to arrive. I received a message on the 29th of November from COMSUBLANT congratulating me on the birth of my daughter and assuring me both mother and daughter were fine.

Muriel was told by the squadron that we could be home any day now but all movements were classified. Muriel stayed in New London because she wanted to greet me with the baby. However, she contracted an infection mid-December, and her mother came and took Muriel and Val to her house in New Jersey to recuperate and await my arrival.

The boat returned to New London at Christmas. I had a quick visit with Muriel in New Jersey but I left her there because we had been told we would redeploy in January. Everyone was working overtime to refit and load out for another North Atlantic transit in the dead of winter. Fortunately, our deployment was postponed and I brought Muriel and Val back to New London. Most of 1957 was spent at sea devoted to research and development projects for SUBDEVGRU-TWO and Muriel got us settled into our new home in Ledyard.

My second daughter, Janet, was born on 26 March 1958. I had been at sea in CAVALLA as part of an Anti-Submarine Warfare group looking for a Russian submarine reported by a coastal fisherman. CAVALLA had been abruptly ordered back to port with no explanation. We were met at the New London Ledge Light late on the 25th by our Commodore. The Captain was told to let no one off the ship, and we would get underway at first light on the 26th. Although no one was supposed to know we were returning to port, someone informed Muriel that we were back.

Muriel called, got through to me, told me she was in labor, and to come get her. I disobeyed orders to remain on board, borrowed a car, picked her up, and delivered her to the SUBASE hospital. I quickly returned to the boat to finish preparations for our underway. A few hours later, just before we sailed, I ran back to the hospital where a sedated Muriel had delivered our second daughter, Janet. I looked at the baby and her head was a mess, although the nurses had thoughtfully tied a pink bow in her dark hair. Her misshapened forehead was a 45° angle from eyebrows to the back of an oblong head. I kissed Muriel goodbye and went to sea.

At sea, I fretted about what we would do to correct the baby's disfiguration. I wondered how many operations would be required to restructure her head and I was also concerned for Muriel having to care for Valerie and now Janet with her problems all by herself. It was an enormous relief to see a beautiful, perfectly proportioned baby girl on my return home.

Sally, our third daughter, was born on 14 November 1961. Once again, I was at sea. We were on a special operation and all communications were prohibited. We received a daily radio broadcast but the messages were strictly operational, brief, and as few as possible to prevent having to copy the submarine broadcast from interfering with our mission.

I began haunting the radio room the first week in November. I decrypted all incoming messages except those designated, *Commanding Officer's Eyes Only*. By the second week in November I grew more concerned as the doctor had predicted a mid-November delivery. By the end of the third week, I was sure something had gone wrong and one of those *CO Eyes Only* messages had been informing the skipper of the loss of Muriel or the baby, or both. I

accused the Captain and the Executive Officer of not telling me—knowing there was nothing I could do and they didn't want to create a bigger morale problem. The CO and XO both assured me there had been no such message received.

I prepared a message. "INTERROGATIVE HINKLE BABY," encrypted it, and the Captain assured me it would be sent the minute we exited the No Comms Zone. Many anxious days passed. Finally, we headed home and my message was being set up for transmission when we received a high priority incoming message. "HINKLE BABY BORN 14 NOVEMBER. MOTHER & DAUGHTER FINE. COMSUBLANT SENDS PERSONAL REGRETS FOR LATE DELIVERY THIS MESSAGE."

Muriel said the arrival of the third baby was the easiest. She had made arrangements with our good friend and neighbor, Art Gilmore, to take her to the hospital, and he had been more excited and worried than she was. Muriel remembers, "I had gone for a check-up on Thursday, 9 November, and the doctor scheduled an appointment for induced labor on Tuesday, the 14th at 0830 check-in time. I called Art Thursday evening to tell him of the plan and when I told him who was calling, he said "I'll be right there to drive you to the hospital!" "No, no. Not yet, Art—Tuesday morning at 0800" and explained the baby would be induced at that time. We both marveled at the civility of an appointment."

Life at sea was hard and years of continuous sea duty harder, but the wives had an equally difficult struggle. Bearing and raising children with husbands gone most of the time, being separated with little communication for months on end, moving the family often, alone, and on short notice, were just some of the costs the wives paid to support husbands and the submarine service throughout the decades of the Cold War.

Yes, the Cold War was won. We can rejoice there was no nuclear holocaust and the world is definitely a better place for the sacrifices made but there was a price paid and I think of it every time I see one of my daughters and I appreciate Muriel more than words can tell.■

THE TOMAHAWK CRUISE MISSILE BRIEFING A FIRST PERSON ACCOUNT

by TMC(SS) Patrick Meagher, USN(Ret)

TMC(SS) Patrick Meagher USN(Ret) qualified and served on USS CUSK SS-348, USS ANDREW JACKSON SSBN-619B, and USS BARBEL SS-580. He served on active duty with the Submarine Force from 1960 through 1977. He is a life member of USSVI, and an associate member of USSVWWII.

In late spring 1977 Rear Admiral Charles H. Griffiths, Commander Submarine Force U. S. Pacific Fleet, tasked his staff weapons shop to provide him with a briefing on the Tomahawk Cruise Missile as soon as possible. This tasker ended up with LCDR Charles *Tex* Hudiburgh. Tex was an LDO, a former submarine Fire Control Technician, who after commissioning returned to diesel boats and qualified as an officer. He had completed his command tour as skipper of USS WHITE SANDS AGDS-1, a deep submergence program support ship. Tex had been on SubPac staff for about two years as the Submarine Force Conventional Weapons Officer (N611). He had a calm and cheerful demeanor, and regularly developed *creative* methods to overcome the bureaucratic hurdles common to a large staff organization. In 1975 I had assisted Tex with a long overdue major revision of SubPac Ordnance Notes, which contained detailed weapons safety, operations, maintenance, logistic, and support guidance to the Submarine Force. At the time I was working in the tactical nuclear weapons shop as the Assistant for Nuclear Weapons Safety and Inspections (N6121). The SubPac Tactical Weapons shop was a busy place and we were short handed with several enlisted billets gapped.

Tex rapidly grew frustrated as he discovered there was no official information on Tomahawk available on the staff or with any of the tech reps working with the Submarine Force. Remember, this was 1977, long before desktop computers, the internet and e-mail. In addition, Tomahawk at that stage was designed to have a nuclear

warhead so whatever information that was available was assumed to be classified Secret or higher. Tex checked with me to see if we had any official information on the Tomahawk and its nuclear warhead. I assured him we did not. He then went on in his slow Texas drawl to vent his frustration with the *short-fused* briefing tasker and that he could not find any information on the Tomahawk Cruise Missile. When he finished I informed him he was in luck. He asked, "How so?" I explained that two months previously the monthly magazine *Scientific American* had an extensive article on Tomahawk and its guidance system, that I still had the magazine at home, and did he want it? Tex response was, "You're _ _ _ _ _ _ _' me!" I said, "No I was not, and I would bring the magazine in tomorrow morning", which I did.

The article was surprisingly detailed although sensitive information on the warhead was not included. There was a description of how the Terrain Contour Mapping (TERCOM) guidance system worked and the article was complete with a number of diagrams and illustrations. Tex pored over the article. He told me he could not believe all the technical information on Tomahawk was unclassified and available in a Magazine you could buy anywhere! By the end of the day he was back to his normal operating style as he began drafting his briefing. Over the next several days he kept the Tactical Weapons Shop Yeoman busy creating viewgraphs. Tex shared his briefing materials with several of us and solicited our thoughts and ideas.

CDR Terry Mahoney the Submarine Force Tactical Weapons Officer (N61) liked Tex's presentation and support material which included xeroxed copies of the *Scientific American* article on Tomahawk. He also told him there would be a *murder board* in a couple of days with the Submarine Force Weapons Officer (N6) and a number of other staff officers attending.

Briefing a Flag Officer is a big deal. If you're the briefer you don't want to screw up and embarrass your boss or your bosses boss. A *murder board* is designed with that in mind. It includes everyone above you in the chain of command who could possibly be embarrassed if you screwed up. The *murder board* will listen to your briefing, and observe your presentation style and aids. You will receive a critique and recommendations for improvement

—guaranteed. Two days later the Tactical Weapons shop staff trooped over to the Admirals briefing Room. We were joined by the Force Weapons officer, and several other *staffies*. Tex took his place behind the podium, acquainted himself with the controls for lighting and microphone. He began his presentation and directed the Yeoman handling the viewgraphs to change them as he proceeded. The presentation lasted about 10 minutes. Tex received some *feedback* on his presentation *style*. There was none on the content; everyone was impressed with the technical material. I don't recall if he revealed the source for his briefing, I don't think he did, however it was an *open secret* within the Weapons shop that *Scientific American* was the source.

A couple of days later we again all trooped over to the Admirals briefing Room for Tex's presentation for the Admiral. For several of us this was our first time attending a ComSubPac daily briefing. What I remember was that Tex's briefing was preceded by a run down on Submarine Force status including location of all units. When the submarine status report was finished Tex took the podium and introduced his briefing in the standard Navy manner. Tell'em what your going to brief, give'em the briefing, then tell'em what you just briefed. Tex's presentation took about 10 minutes. The Admiral thanked Tex for an excellent brief on Tomahawk and then tasked N6 to stay on top of Tomahawk development issues as they pertained to submarines. While Admiral Griffiths did not ask about the source of Tex's Tomahawk information I'm pretty sure he was told that it came from the Magazine Scientific American. Back in the office Tex again thanked me for providing him with the source of his material and said he couldn't have done it without that magazine article. To my knowledge there was never any thought given to classifying Tex's Tomahawk briefing.

AFTERWORD:

During the cold war, information about submarines, the Submarine Force, submarine operations, and submarine weapons was tightly controlled. Given that reality, all of us in the Tactical Weapons Shop at SubPac were amazed that DOD allowed the authors of the Scientific American article to include all the technical

information on the Tomahawk cruise missile, the flight path, and the wealth of detail on TERCOM.

However, since reading Tom Clancy's book *Submarine* several years ago, I've wondered if DOD solicited the article to let the Soviets know that the nuclear arms race was still on even though the Strategic Arms Limitations Talks (SALT) treaty had been signed in 1972.[1]

During June-July 2006, I contacted Tex Hudiburgh by phone and e-mail. He reviewed and approved my manuscript, "don't change a word" as he put it. Tex informed me that it was only in 1980 that he learned that NavAirSysCom was Tomahawks sponsor. At that time he was the Naval Ocean Systems Center (NOSC) Operations Officer in San Diego CA where he was involved with Tomahawk testing. As I have worked on this story and talked with Tex and other former shipmates I believe that most of us had a serious *stovepipe mentality* of weapons systems development. Traditionally, submarine weapons systems program sponsors were NavOrdSysCom, NavSeaSysCom, or a combination of both. None of us at that time would conceive the idea that NavAirSysCom was the Tomahawk Program sponsor.[2]

Tex retired as a Commander a number of years ago. Today he is the owner of HUDMAC INC. a successful San Diego CA ship repair company.

Notes:

- Tom Clancy, in his book, *Submarine* reports a rumor that Henry Kissinger indirectly initiated DOD's research to develop nuclear armed cruise missiles with his request to DOD to identify what types of nuclear weapons delivery systems would fall outside the START Treaty Definitions of nuclear weapons systems to be retired.

- A fellow Submariner and shipmate from my time on USS BARBEL SS-580 in the early 70's informed me he was in the *Outlaw Shark* office (PME-108) in 1980. In his words, "Nobody there knew what TH would really do and they were going to do the Fire Control for it."

THE VISIT BY CONGRESSMAN CRAIG HOSMER

by CAPT. C. A. K. McDonald, USN(Ret)
Commanding Officer (Gold) USS ULYSSES S. GRANT
(SSBN 631) 1963-1967

It was a classic entre nous. Admiral Rickover had called Captain From, the Commissioning Blue Commanding Officer, with a special request. Captain From, one of the Admiral's most trusted and experienced skippers, would be the host of Congressman Craig Hosmer during the Blue test firing of a Polaris A-3 missile from USS ULYSSES S. GRANT (SSBN 631) near Cape Kennedy. It would be a private visit and the main Navy hierarchy and Public Affairs people would be excluded. To this request Captain From readily agreed.

Over the years Admiral Rickover had fought and won many battles. There were generally three basic reasons for his success. First, he had a deep understanding of the meaning, intent and fine print of the legislation, principally the Atomic Energy Act of 1954. Second, he was strongly supported by the Atomic Energy Commission. Third, and by no means last, he enjoyed the steadfast support of the Joint Committee on Atomic Energy (JCAE). The JCAE was one of those rare instances where the two Houses of Congress agreed to have one committee, with joint membership, deal with a certain issue—in this case Atomic Energy. In this Committee the ranking minority (Republican) member had been a congressman from the Long Beach area of California for many years—Craig Hosmer. For his loyalty Admiral Rickover wanted to do something special; in this case arranging a trip on a Polaris submarine to witness a test firing.

The visit went very well with the firing on schedule and the missile on target. Upon return to port the Special Projects Representative on site, Captain William (Pappy) Sims, asked the Congressman if he needed a ride to the airport. Mr. Hosmer replied that he had come to the Cape to ride a submarine and he intended to continue to do that. So it happened that he was a welcome but unexpected visitor when I took GRANT to sea for a short sea trial period to do basic drills and such.

On the second day the weather turned stormy. It was September and the attendant hurricane season. The weather report showed a hurricane rapidly building. I decided that under the circumstances the best course of action would be to stay at sea. I told the congressman of my decision and asked what I could do for him. He said that he would like to write two messages, one to his wife and one to his secretary, and would I please ensure that the messages were sent. I assured him that I would make certain that they were transmitted.

So it came to pass the Mr. Hosmer was at sea in GRANT for five days instead of the planned three. During that period he was a perfect guest and the officers and men in my crew went out of their way to be sociable with the Congressman.

Upon our return I called Admiral Rickover who by now had learned of the change in the basic plan. I told him that the Congressman was even now en route back to Washington. I explained that during the period we held several drills including scram drills. I assured the Admiral that Mr. Hosmer was very impressed with the professionalism and the teamwork shown. I then mentioned a special event of interest. I said that while in the tunnel Mr. Hosmer had asked if he could have his picture taken near a valve which was manufactured in his district.

"What did you say" screamed the Admiral. "I told him that it was not permitted under the rules."

"That's right, he was probably just testing you, you know."

I went on to say that we did have some photographs taken in the forward part of the ship and the periscope stand in particular.

"GET-ME-THOSE-PICTURES"

"Aye, aye, Admiral"

"Good bye"

Needless to say, all the other issues of the moment were set aside while I set about locating the films, Fortunately, Andy Urbanc had already started the process and so, in reasonably short order, the photographs were sent Express Mail to the Admiral.

Congressman Hosmer and I corresponded until his death in 1982.■

A BRIEF ENCOUNTER IN LONG ISLAND SOUND

By Mr. Richard Boyle

Author's Preface: This event took place more than 50 years ago, and has been reconstructed by an imperfect memory. Hopefully, the reader will agree that it is worthy of a look into the past.

In the spring of 1955, I was OOD on USS SEA OWL (SS 405), lying to on the surface at night in Long Island Sound. The weather was crystal clear and the sea was flat calm. A battery charge was in progress, and within a few hours we were scheduled to provided services to ASW aircraft.

The silence on the bridge was broken by a report from Radar that a large target was detected over the horizon. Tracking commenced. The first visual sign on the horizon was the masthead light. Speed was calculated to be more than 30 knots. Soon we could see the port running light, but as the situation became better defined, both running lights were in view. Visions of a port to port passage evaporated.

The only sensible option was to *get the hell out of the way*. Orders were issued to secure the battery charge and prepare to answer bells on four main engines. As soon as we could, we roared out of the way to port, and soon had a huge ocean liner in sight with a starboard angle on the bow, which got bigger as we pulled away. She was lit up like a Christmas tree, and as she sped by, I had the Quartermaster challenge her by a signal light. The answer: LIBERTÉ. She was obviously headed for New York City.

Not much thought was given to her heritage at the time, but recently the author looked up some details of her history.

Build by Germany and named EUROPA, she was one of the fastest liners in the world, and won the Blue Ribbon in 1931, with a crossing of the North Atlantic at an average speed of 27.91 knots. France took her over as a war prize after World War II, and renamed her LIBERTÉ. While undergoing refurbishment at Le Havre, during a violent storm, she was torn from her berth and into the wreckage of another liner moored nearby. LIBERTÉ sank. After being

refloated, in 1948 she was towed to St. Nazaire and underwent a total refit and refurbishment. She finally made her maiden voyage in August 1950 and began service on the Atlantic run. Her final voyage was made in November of 1958, and she was scrapped in 1962.■

A REAL "SEWER PIPE" SAILOR

by CAPT. Jack O'Connell, USN(Ret)

According to old time submarine sailors they used to be referred to as *sewer pipe sailors* by the surface Navy types, allegedly because of the odor in the boats. That odor came from diesel oil, lubricating oil, sweat and unwashed bodies. At sea most diesel submarines only opened the showers once a week since they carried so little fresh water and were leery about wasting it. Every bit of fresh water had to be distilled from sea water and that took *juice* from the battery, limiting the submarine speed and submerged endurance. The distillers also made noise and thus the commanding officer frequently wanted to minimize their use while operating submerged on the battery lest tell-tale noises reveal the submarine's position to an opposing force. That era ended with the advent of nuclear power and the ability to generate almost unlimited amounts of fresh water. But during the 1950s when there were very few SSNs in commission it was still possible to find a sewer-pipe sailor.

It was late 1956 just before the November Suez Crisis that took USS CAIMAN (SS 323) on an unplanned excursion to Westpac (along with many other ships and submarines). We were up in the shipyard at Hunter's Point for battery replacement. I was the engineer officer. Late one night the duty officer on CAIMAN got a telephone call from another submarine moored nearby. Their topside watch had spotted a sailor in uniform coming down the pier seemingly under the influence of intoxicating beverages—from his wobbling pace and meandering from side to side. Their topside watch saw the man stop, pull up a manhole cover and disappear down the hole. He didn't recognize him as one of their sailors so decided to alert CAIMAN.

The duty chief and another man from CAIMAN duty section went up the pier, came to the still open hole and found one of our enginemen, a first class petty officer as I recall, at the bottom of the ladder, sound asleep with his head pillowed on his neatly folded blue blouse. They roused him and took him back to the CAIMAN after

battery compartment and put him in his bunk.

Word got around the boat rapidly and it was a long time before he lived down the humorous charge that he couldn't distinguish the after battery compartment of CAIMAN from a sewer.■

BOOK REVIEWS

I-400 JAPAN'S SECRET AIRCRAFT-CARRYING STRIKE SUBMARINE
by Henry Sakaida, Gary Nila and Koji Takaki

Hikoki Publications Limited
Marsden Hill, Crowborough, East Sussex TN6 1XH
144pp–$49.95–ISBN 1 902109 45 7
(May be ordered from Specialty Press (800)-895-4585)
Reviewed by CAPT Jim Hay, USN(Ret)

This is a *coffee-table* book in which the photographs and illustrations deserve at least equal billing with the text. There are several artists's illustrations of the submarine and line drawings of the aircraft. Most of the Japanese photos are of the people involved in the operation with very few of the boats and aircraft since the entire project was highly classified. After the surrender there were many USN photographs taken of the submarine and they are displayed in the book to excellent advantage. There is also reproduced the letter reporting the Navy's technical examination of the boat in drydock at Pearl Harbor and a number of pictures taken with that survey.

The story of Imperial Japan's largest submarines is a fascinating one from both technical and strategic aspects. They were conceived in early 1942 for air strikes against American East Coast cities. The submarines had to be long enough to support the 50 meter catapult rails needed for the heavier offensive aircraft and big enough to support the weight of three planes and all the necessary equipment. The initial plan was for a class of 18 but due to material shortages only five were started and only three ever got to sea. The aircraft were also designed especially for the submarine strike mission. Each of the Seiran M6A planes weighed over 7,000 pounds and carried either an 800kg bomb or torpedo. This was truly an ambitious project to build, and it was undertaken for a very ambitious mission.

During construction of the submarines and the building of their aircraft, the mission was changed to an attack on the Panama Canal

to deny its use to the US Navy and American merchant shipping supporting the Pacific War. The book gives ample attention to the command and planning for the operation and discusses the senior officers in detail. There is also a fair amount of information given about the formation and training of the flight units. Technical details about the submarines are rather general with very little said about the submerged ship handling of the 5200 ton (submerged), 400 foot submarine. The aircraft characteristics and performance are treated rather more fully.

By June of 1945 the Japanese Naval General Staff realized the Panama Canal mission was no longer of prime importance and focused its submarine strike force aim on the fleet anchorage at Ulithi. By the 14th of August I-400 and I-401 were in position southeast of Ulithi ready for an early morning launch of a six plane *kamikazi* attack on the fleet anchorage on the 17th of August. On the 15th they heard their Emperor announce Japan's surrender. That was backed up by a formal cease-fire order from the Naval General Staff later that day. Their ordered return to Japan, of course, had to be carried out through the US Fleet then steaming toward Tokyo Bay. The high seas interactions provided a certain amount of drama to both the American and Japanese sailors. That ends the Japanese part of the I-400 story.

The American side of the I-400 story is covered by the book and starts just prior to the formal surrender on the deck of MISSOURI when a prize crew boarded the I-400 at sea. Actually it was two prize crews which took charge of the big boat, but that's a tale left to the book itself. It then continues with a final chapter devoted to the USN crew's trip from Japan to Pearl Harbor.

There are several other sides to that whole end-of-war period in the life of the Imperial Japanese Submarine Service. It will be remembered that the April '06 issue of THE SUBMARINE REVIEW carried Dr. Thomas O. Paine's 1984 account of his experiences ashore in Sasebo right after the cease-fire in '45. His mission was to help disarm and neutralize the Japanese Submarine Force, and also to collect samples of armament, particularly torpedoes. He recounted boarding the I-402 as it entered the harbor and his first experiences with the (then) huge aircraft-carrying submarines. If you haven't already read that account, which was in the form of a letter

from Tom Paine to Richard Compton-Hall at the Royal Navy Submarine Museum, you should do so. It is a really hilarious story about getting the I-400 ready for it's cross-Pacific trip to Pearl and the trip itself. Paine was the Exec of the prize crew for that endeavor.

Another aspect of that end-of-war adventure into Japan by USN submariners is told in this issue of THE SUBMARINE REVIEW by RADM Joe Vasey in Submariners Ashore in Yokosuka Before VJ Day. As an aside, it was Admiral Vasey who provided me with the copy of Paine's 1984 letter to Compton-Hall. They were friends who stayed in touch after the war and often discussed all the new pan-Pacific issues which had to be addressed in the 60s,70s and 80s.

There is at least one other part of that 1945 submariner-pre VJ Day-expedition-to-Japan story which was completely unrelated to those in the Admiral Vasey story. It was touched upon much earlier in these pages in a Book Review of VADM Jim Calvert's book Silent Running. He was Exec of HADDO, and while moored alongside PROTEUS in Tokyo Bay awaiting the formal surrender aboard MISSOURI, submarine officers were afforded the opportunity to tour the Japanese Submarine Base at Yokosuka "on the southernmost curve of Tokyo Bay". They were warned specifically not to leave the base and to return to their ships when finished with the tour. When a large hole in the fence provided an opportunity to explore a bit further afield Calvert and several other HADDO officers walked through the hole and took a train to Tokyo–in a very unauthorized, and unescorted, tour of the enemy capitol. That also is a tale worth hearing more than once, particularly the part of how they got out of their arrest on return to Yokosuka.■

SUBMARINE DISASTERS
BY DAVID MILLER

The Lyons Press
$34.95 Hardcover, 144 Pages
ISBN 1-59228-815-4
September 1, 2006

Reviewed by CAPT C. Michael Garverick, USN(Ret)

David Miller is no stranger to the Naval Submarine League – he has written several articles for the Review and attended our annual symposium. However, it was interesting to learn that he is a retired Colonel from the British Army. I wondered why he would be writing a book about submarine disasters. Through email, I quickly learned that he has specialized in naval matters and has published six books on submarines. Through his writing and personal experience on several submarines he has become familiar with the world of the submariner. This book provides him the opportunity to pay his respects to those who go down in the sea in ships.

Submarine Disasters is a coffee-table book with a picture of SQUALUS, surfacing after her disaster, on the dust cover. The pictures in this volume alone will capture your attention as many have not been published before in such a wide collection.

Miller organizes his research in five time periods covering over 150 years of submarine history. Within this framework he analyzes submarine losses that are not related to submarine warfare— sunk by enemy action or scuttling to avoid capture by the enemy. He reviews four other causes of submarine disasters—hazards of the sea (grounding, foundering), collisions, equipment malfunctions, and human error. Some disasters are due to unknown causes and not otherwise classified—like USS SCORPION (SSN 589). Others fall into a category he calls *constructive total loss* when the submarine suffered a disaster, was recovered, but then surveyed due to the extent of damage.

Submarine Disasters also analyzes some functional problems associated with submarine development over the last 150 years. The author starts with the fact that the nature of submarine operations is still not well understood. Submerging a ship in a body of water, operating in an opaque environment, and surfacing without hitting something still haunts the submariner. Proper use of materials, specifications, and methods in fabricating submarines remains a problem. Complexity continues to challenge the designer, builder, operator, and supporter. He identifies several early disasters where the submarine was functionally inept—specifically the HUNLEY that sank three times with the loss of three crews—a record that does not need to be challenged!

There are many examples where human error is identified with a specific disaster, but Miller takes the initiative to identify situations where profound leadership is responsible for the recovery of the crew and salvaging the submarine. He cites an early example in 1851 where a small German submarine on sea trials reached a depth of 30 feet when the hull started to distort and lost propulsion—the hand crank fell off the shaft that turned the propeller. The submarine sank in 53 feet of water. The Captain (also the designer and builder) encouraged the two other crew members (engineers responsible for turning the screw) to remain calm until the pressure equalized in the submarine. He then opened the hatch and did a free ascent escape without loss of life.

Technology continues to challenge the safe operation of submarines. Gasoline fumes were a major problem in atmosphere control. Mice seemed to be the alerting mechanism rather than canaries. As new fluids and weapons were introduced, different processes created explosions that accounted for many submarine disasters, the latest being KURSK. The introduction of batteries created a new source of problems and still concerns submariners.

The low profile of a surfaced submarine has been a common problem throughout their history. Even with additional lights, radar, bridge-to-bridge communications, and a strong qualification program for submarine operators, submarines continue to have collisions with surface ships. Miller provides a long list of various ways a submarine was at risk on the surface.

The author provides an extensive list of submarine disasters in

a six page table in a separate section of his book. You may be concerned that several incidents are not included in the table, but he caveats the table with some exclusion criteria and recent disasters may too recent to be incorporated.

The final section of the book is a thorough discussion of submarine search and rescue. The recent response and rescue of the Russian submersible PRIZ is covered as is the International Submarine Escape and Rescue Liaison Office (ISMERLO). Miller notes that some 65 submarines built for the United States Navy have been lost during their service—more than ten percent of the total number built. Many were lost during war operations while others were lost when the sea was the only declared foe.

Submarine Disasters will be a fine addition to anyone's submarine library and a rich resource of a history that is rather unique to naval operations—rescue of a crew from inner space where there are limited opportunities to reach the submarine.■

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FIRE AT SEA: The Tragedy Of The Soviet Submarine KOMSOMOLETS
By D. A. ROMANOV
Edited by K. J. Moore

Potomac Books, Inc.
Washington, D.C.
267pp-$35.00-ISBN 1-57488-426-3
Reviewed by RADM Thomas Evans, USN(Ret)

NOTE: Admiral Evans was serving as Deputy Chief Engineer of the Navy (Submarines) in the Naval Sea Systems Command at the time of the loss of the ***KOMSOMOLETS.*** *He has served as technical adviser for two books on the tragic loss of* ***KURSK****, and most recently for* ***Silent Steel: The Mysterious Death of the Nuclear Attack Sub USS SCORPION****, by Stephen Johnson.*

This extraordinary book chronicles the sinking in 1989 of the K-278, ***Komsomolets***, the Soviet Navy's newest and most advanced nuclear attack submarine, known to NATO and the West as the *Mike* Class. While on her initial operational deployment in the Norwegian Sea on 7 April 7 1989, the ship foundered and sank as the ultimate result of an uncontrollable fire in the engineering compartments and related hull flooding. Of the 67 members of the crew, 42 men perished. Tragically, the ship could have been saved had a different set of pre-deployment preparations, training, command decisions, and casualty corrective actions occurred.

K-278 (Project 685) was a mystery to Western intelligence organizations until her rollout at the Severodzinsk shipyard on the White Sea. She was laid down in 1978, launched in 1983, and commissioned in late 1984. Initial analyses predicted that K-278 would be an advanced, nuclear attack submarine development platform with a double hull and titanium pressure hull, which proved accurate. An expected power plant of two liquid metal reactors turned out to be a single pressurized water reactor more in line with other newer attack submarine classes. At a length of 117.5 meters

and 8,500 tons submerged displacement, this was a large submarine. She mounted six 633-mm (21-inch) torpedo tubes, and could fire ASW missiles, and was fitted with a completely modern acoustic sensor suite. The overall ship design produced a fully capable warship with unprecedented depth performance.

K-278 was a deep-diving, highly automated submarine with a small crew of only 57 men, nearly all of whom were supposed to be officers and warrant officers, with just a few conscripts. The ship clearly required a highly trained, technically skilled crew supported by a robust maintenance, training and logistics infrastructure ashore. An extensive and very successful trials and regional operations period lasting from 1984 to 1988 included a record-setting operational dive to over 1300 meters.

In October 1988, she was honored by becoming one of the few Soviet submarines to be given an actual name: ***Komsomolets***, "A Member of the Young Communist League". The first major period in the short life of ***Komsomolets*** had now ended. In a sense, the ship's fate was about to be sealed. ***FIRE AT SEA*** is the story of her demise.

The author of FIRE AT SEA is D.A. Romanov, who was the chief designer of ***Komsomolets***. Following the disaster and the release of the results of the Soviet State Commission that conducted the formal investigation, the Soviet Navy immediately laid virtually full blame for the loss of the ship on the submarine design bureau. In the book, Romanov presents a vigorous defense to that indictment, seeking to prove that inadequate training and qualification of the replacement crew assigned to conduct the forthcoming operational deployment period, and poor operational decisions by both the command staff ashore and by the Commanding Officer at sea during the disaster were principally to blame. His convincing objectivity in this difficult task is evident.

Tempering Romanov's narrative analysis is the skillful editorial role played in this important naval documentary by K. J. Moore, a former U.S. Navy Submariner and a preeminent submarine warfare technologist and engineer. The overall result is provocative and compelling.

At 1100 on the morning of 7 April 1989, ***Komsomolets*** was submerged at deep depth when a fire was reported in the 7th and last

compartment in the ship. Alarms were sounded but damage control response was very slow. Fed by atmospheric control air bleeding into the compartment, the fire rapidly went out of control. The ship surfaced at 1011. Attempts were made to isolate the after compartments, but they were unsuccessful. Ultimately the fire spread and smoke contaminated the ventilation system. The intense heat caused hull fittings to fail and flooding began in the stern area. Longitudinal stability over the next few hours gradually degraded.

Radio communications were finally established with submarine shore command, but confusion and delays prevented an accurate report from being understood and the gravity of the situation was not recognized. IL-38 patrol aircraft finally appeared on the scene and relayed messages ashore. Rescue ships in the area were finally dispatched, but too late. The captain finally ordered all those still below decks to lay topside, but in such a rush that many men were unable to obtain life jackets and exposure clothing. Attempts to rig life rafts were hampered by confusing release mechanisms and waves washing over the deck.

It is important to note that the crew had never conducted an *Abandon Ship* exercise during the pre-deployment period.

With rescue ships over an hour away and the ship on the verge of sinking by the stern, the order to abandon ship was finally given at about 1645. The captain and four other men who were still below decks hastily entered the rescue sphere and attempted to rig it for release. As the ship began to slide below the surface at a steep angle, they tried to launch the sphere. The sphere finally broke free and rose rapidly to the surface. When the five survivors opened the hatch, pressure in the chamber blew one man out the hatch, one scrambled out into the sea, and the sphere sank taking three men to the bottom. By the time the rescue ships finally arrived in the growing darkness, only 25 survivors in the sea remained alive out of the 67 embarked.

During the investigation and open criticism discussion that followed, the following critical causes of the disaster (among others) were revealed and debated, with blame variously assigned according to the roles of the debating parties. From the perspective of a U.S. Navy nuclear submarine officer, these become very clear from reading this book. Pre-deployment training and qualification for the

ship and crew were totally inadequate and incomplete. The ship's approved manning document was liberally altered to substitute conscripts for warrant officers without proper compensation. A critical master damage control document, equivalent to the U.S. Navy Damage Control Book from which individual compartment damage control bills were to be developed was never prepared and delivered to the ship by the building yard and the Navy. And the list goes on and on.

The story of the death of ***Komsomolets*** and the Soviet Navy's corrective actions plan should have produced sweeping changes to Submarine Force training, qualification and certification; manning and assignment policy; technical and maintenance support and assistance; and a philosophy of safety first above all. Of course it did not, despite numerous lofty, official pronouncements of such a plan. If this initiative had moved forward with forceful execution, could the Soviet Navy have prevented the August 2000 loss of the OSCAR-Class SSGN ***KURSK*** which suffered a catastrophic internal exercise torpedo explosion in the Barents Sea that sank that huge warship with the loss of all 118 hands? Perhaps. As history has shown us, it did not.

Fire At Sea is a riveting account of what happens when leaders ignore the cardinal principles of operating a highly technical and sophisticated warship intended to patrol on the precipitous edge of a hostile and unforgiving environment, the deep sea. This important book should be mandatory reading for all submariners, and at the same time will be a fascinating and disturbing narrative for all readers interested in modern naval warship technology and its uncertain challenges.■

THE SUBMARINE REVIEW

THE SUBMARINE REVIEW is a quarterly publication of the Naval Submarine League. It is a forum for discussion of submarine matters, be they of past, present or future aspects of the ships, weapons and men who train and carry out undersea warfare. It is the intention of the **REVIEW** to reflect not only the views of Naval Submarine League members but of all who are interested in submarining.

Articles for this magazine will be accepted on any subject closely related to submarine matters. Article length should be no longer than 2500 to 3000 words. Subjects requiring longer treatment should be prepared in parts for sequential publication. Electronic submission is preferred with either MS Word or Word Perfect as acceptable systems. If paper copy is submitted, an accompanying 3.5"diskette will be of significant assistance. Content, timing and originality of thought are of first importance in the selection of articles for the **REVIEW**.

A stipend of up to $200.00 will be paid for each major article published. For shorter Reflections, Sea Stories, etc., $100.00 is usual. Book reviewers are awarded $52.00, which is that special figure to honor the U.S. submarines lost during World War II. Annually, three articles are selected for special recognition and an additional honorarium of up to $400.00 will be awarded to the authors. **Articles accepted for publication in the REVIEW become the property of the Naval Submarine League.** The views expressed by the authors are their own and are not to be construed to be those of the Naval Submarine League. In those instances where the NSL has taken and published an official position or view, specific reference to that fact will accompany the article.

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

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

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