Chapter 1

THE FUTURE OF SEA-BASED DETERRENCE

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The concept of nuclear "deterrence" is based on the reasonable assumption that no nation will contemplate a nuclear attack on another if such an attack inexorably brings prompt and massive destruction to itself. Perhaps the most significant long-range consequence of the recent SALT agreements is the mutual acceptance of this concept by both the United States and the Soviet Union.

A doctrine of mutual deterrence is not necessarily easy to reconcile with ordinary instincts; but neither are most matters connected with nuclear weapons. Those who are impatient to remove nuclear weapons from the human stage, would be opposed to such a doctrine since it tends to institutionalize the existence of nuclear arsenals. To those who think in terms of conventional military power, the logic of mutual nuclear deterrence is also hard to swallow as a fundamental policy. Not only does it require the acceptance of a military situation wherein one's own country is itself deterred from initiating nuclear war, but the very logic of deterrence involves the inversion of the meaning of offensive and defensive weapons as they would be judged in conventional military terms. Thus the installation of an effective anti-ballistic missile system (ABM) to protect one's population cannot be viewed as a benign defensive measure. It can only be seen by the other side as a threatening system since it reduces their ability to deter,

thus reducing their ultimate security from nuclear attack. As a consequence, for purely defensive reasons, the offensive capability of one side must be increased in order to overcome the other side's new "defensive" system. A stable situation requires the acceptance of the fact that a fraction of one's population is permanently hostage to the other side--an uncomfortable idea at best.

The cornerstone of national security in a world dependent on mutual deterrence is the confidence that one can, in fact, cause unacceptable damage to the other side no matter what else happens. Without this confidence on both sides, a continuing arms competition is inevitable. Such a confidence clearly depends on the survivability of "sufficient" retaliatory weapons in spite of an opponent's best efforts to destroy them or prevent their use. It is perhaps difficult to imagine "first-strike" (a surprise attack designed to wipe out the other side's retaliatory force) as a rational political alternative undertaken by any nation under any circumstances, but it is nevertheless difficult to postulate a less extreme case as a sufficient measure of the invulnerability of a deterrent force--at least one which must be politically convincing domestically. While both major nuclear powers assert that it is their national policy not to develop a first-strike capability, it is clearly in the best interests of both nations, through their own military developments and through mutual agreements, to make first-strike a practical impossibility and not just a matter of professed intentions.

The submarine-launched, ballistic missile (SLBM) has been recognized by both the U.S. and the U.S.S.R. as providing a system which is enormously difficult to destroy by surprise and therefore capable of filling a substantial part of the require-

ments of nuclear deterrence. Both major powers now have submarine missile fleets of roughly comparable size and capability.

A key issue for both sides is that of the relative invulnerability of their submarine-based deterrent systems into the future. Can a new development in antisubmarine warfare suddenly make a missile carrying submarine much more vulnerable? Is it possible that tactical military forces possessed by the other side could be employed in a manner that would neutralize the submarine based deterrent? If the answer to such questions is "maybe" or even a reasoned "just possibly", then mutual agreements with respect to ASW may make sense in the future. The Wingspread Conference, the proceedings of which are reported in this volume, was a preliminary attempt to recognize some of the dimensions of this problem.

At least to a first approximation, it would appear that there is a similarity in the security equation between antisubmarine warfare (ASW) and the anti-ballistic missile (ABM). Both, after all, can be considered attempts to reduce or remove the other side's retaliatory ability. The analogy is far from complete, however, and may well be misleading. Submarines are not new inventions and they have many more military roles than nuclear deterrence. Not only are submarines now possessed by many nations in surprisingly large numbers, (1) but both major nuclear powers have substantial numbers of submarines with conventional weapons designed to attack surface ships. In particular, the U.S.S.R. has a very large high-seas fleet of attack submarines which clearly plays a central part in their military thinking. Presumably this fleet, in a major confrontation, would be an important factor in determining control of the use of the high seas. This fleet of attack submarines is the driving force behind the substantial ASW efforts of the U.S. Navy.

The strategic issue of use of the high seas, therefore, is the traditional motivation behind ASW efforts. Judgements about ASW as it relates to the SLBM forces cannot ignore this fact. Any simple-minded notion that ASW can be considered entirely in the context of nuclear deterrence, as is the case with ABM, is out of the question. Also, it is obvious from a purely naval point of view that the possession of effective ASW forces is of much higher priority to the U.S. than to the U.S.S.R. and so any contemplated ASW limitations can have quite unsymmetrical effects.

The questions which motivate the present discussion fall into two categories: (1) What is a reasonable view to take of the future vulnerability of the SLBM system to ASW systems? (2) If required, are there any reasonable and obvious areas where arms limitation agreements in ASW might make sense for both sides? The key question, of course, is the first and it is not easily answered. Not only is the question of security classification an obvious impediment, but ASW is not a single system. It is made up of a myriad of competing and complimentary devices and can "work" only in the context of a complicated tactical game.

There are many difficulties and frustrations in developing a rational framework in which ASW can be assessed. These frustrations impede the technical person, the military planner and the politician alike in making rational assessments of where the "truth" is. This comes about because ASW is a game of hide-and-seek in a very confusing forest. The history of the race between submarines and those trying to catch them is not a simple story of measure and countermeasure masterminded by the scientists. The anti-submarine side has always had to muddle through; and success, if it can be called that, has de-

pended heavily upon tactics, training, the other fellow's mistakes, and the ability to improvise. Success, in a strategic sense, in the two World Wars depended upon overwhelming forces and the waging of a war of attrition; i.e., the willingness to accept losses. The theme has always been equipment that works only sometimes, under some conditions, in some places and only when the submarine did what was expected.

The entire existing suite of ASW systems encompasses every conceivable vehicle--aircraft, helicopters, surface ships and submarines; several kinds of weapons--torpedoes, nuclear bombs, depth charges, mines. Detection can be magnetic, by passive or active acoustic means carried on the vehicle, on a buoy or through a bottom sensor. Beyond this, the actual performance of systems is critically dependent on environmental factors, which can be highly variable, as well as upon the tactics and characteristics of the submarine. (2) In short, ASW is not a simple systems problem which has a uniquely definable solution, or where the outcome of a given situation can be easily predicted analytically. Here again the situation is unlike that presented by the ABM.

We must recognize that for a submarine-based missile system vulnerability must be defined in terms of a counteraction which prevents the system from its mission of retaliation. This means that a score or more of evading nuclear submarines, scattered over millions of square miles in two or three different oceans, must be made simultaneously inoperative within a time measured in terms of minutes. Such a counteraction, to be politically plausible, would have to be conducted with a high degree of certainty. Such a problem is orders of magnitudes greater in difficulty from the one that ASW systems have addressed in the past.

My own view and I think it is shared by others who have worked in the field, is that present ASW systems, because they inevitably involve single tactical encounters with submarines, cannot threaten the SLBM as a nuclear deterrent. Garwin in his paper in this volume (3) makes an exception for a system in which each submarine is kept in close trail by a high-frequency active sonar. However, such a system (and it does not now exist) could readily be outlawed by rather simple mutual agreements because it cannot be employed covertly.

It is more difficult to close out the Tom Swift inventions--new "breakthroughs" which will suddenly make the ASW problem simple. An imaginative person can always invent a secret weapon on paper--some laser in a satellite which sees the submerged submarines. These schemes often sound plausible enough to cause anxiety among politicians and admirals. It is hard to prove that a mythical system will not work; its author, after-all, has such an easy time improving it. And, if this is not sufficient, he can always invoke the cloak of security classification to conceal deficiencies in his arguments. The record shows that most Tom Swifts invent systems that will not work as advertised when tested in the real world: a world with real people and with the real ocean. A system, for example, which detects a submarine 99% of the time in sea conditions which exist 1% of the time, but detects submarines 1% of the time in conditions which are prevalent 80% of the time can hardly pass muster as a threat to SLBMs. And clearly some other system which detects a hundred false targets for every real submarine will be more of a problem than a solution.

In short, what I am saying is this: gadgets that have not been built always sound much better than those that have been built. History demonstrates it, but few believe this simple

truth. If more people did, the taxpayers would save billions of dollars each year.

Although one may have a well-founded opinion that there will be no ASW breakthroughs which will pose a real threat to the SLBM systems, one must confess that an analytical proof of this will never exist. However, it is my opinion that there is a need for trying to formulate the problem in an analytical and general way so that more informed judgements can be made. The most fruitful approach would be one that would avoid the details (usually classified) of specific equipment. That is to say, because of the particularly stringent and demanding requirements involved, ASW as it applies to an SLBM system might logically be approached best from the top down, as a total system which must meet certain well-defined criteria. This would involve defining general criteria on detection, tracking, false targets, weapons, etc. By developing a matrix of all types of systems (e.g., short-range detection vs. long-range detection) one could then compare candidate system types against the generalized criteria. Hopefully the required inputs for the most part could be general scientific and technical knowledge (e.g., what we know about sound propagation in the ocean) and not specific equipment performances. The outcome of such an analysis -- if such an analysis is in fact possible--would be to identify those unique attributes of any ASW system which would be needed in order to pose a real and plausible threat to a submarine based missile system both at the present and as it may evolve in the future. I suggest that such an analytical approach may in fact be a necessity if the issues before us are to be dealt with convincingly.

References

1. G. La Rocque, The Nth Country Submarine/ASW Problem. This volume.

2. K. Tsipis, Underwater Acoustic Detection. This volume.

3. R. L. Garwin, The Intèraction of Anti-Submarine Warfare with the Submarine-Based Deterrent. This volume.