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ATTACKING THE SOVIET SEA BASED DETERRENT: CLEVER FEINT OR FOOLHARDY MANEUVER?

In the event of an outbreak of conventional fighting between the superpowers, declared Navy strategy for warfare against the Soviet Union emphasizes early forward attacks on land, sea, and undersea targets. The most controversial element of this strategy is the stress placed on early attacks against Soviet sea based strategic forces, albeit using conventional weapons, with a view to tying up Soviet attack submarines in their defense. (This is to be distinguished from the notion of attacking Soviet nuclear forces with nuclear weapons during a nuclear war, which is not the subject of this report.) Attacking major Soviet strategic forces in the early phases of a conventional war without the use of nuclear weapons has become a major theme in US naval declarations, whereas a few years ago it was not mentioned.

Offensive vs. Defensive

The basic choices of how to fight the Soviet Navy fall into two categories, which are often called offensive and defensive sea control strategies. Offensive strategies emphasize forward movement of US forces, and attacks on the immediate periphery of the Soviet Union. The largest concentrations of Soviet naval bases are found on the Kola Peninsula in the Arctic, near Vladivostok in the Sea of Japan, and Petropavlovsk on the Kamchatka Peninsula, also in the western Pacific.

Defensive strategies emphasize the use of local defense of naval vessels and natural geographic ocean narrows, or chokepoints, to slow or stop the advance of Soviet vessels and aircraft beyond relatively confined areas. In the Atlantic the distance between the Soviet naval bases and the main chokepoint at Iceland is over 1500 miles, and the chokepoints are surrounded by NATO with large navies, particularly the United Kingdom. In the Pacific, the chokepoints to the Sea of Japan are much narrower in width, and much closer to the main Soviet bases there. In addition, the Soviet naval base at Petropavlovsk on the Kamchatka Peninsula is not confined by a chokepoint. Therefore the implementation of a defensive strategy would differ between the Pacific and the Atlantic.

Existing critics of the offensive strategy say that, if executed, it would widen the war, and generate unnecessary pressures to use nuclear weapons. For example, if Soviet missile submarines were attacked, US aircraft carriers might be sunk with nuclear weapons in retaliation, or nuclear depth charges used against US attack submarines. Critics also question whether extra dollars spent on naval forces in support of such a costly strategy deter the Soviet Union from attacking Europe more effectively than additional troops and supplies on the central front.

Proponents of the strategy say that it generates unique pressures on the Soviet Union to terminate conventional fighting, or that it prevents clashes from even occurring, by threatening to put the Soviet Navy on the defensive early on, and decreasing the number of their nuclear warheads at sea. At the same time, proponents say, the strategy ties up the large Soviet attack submarine force in defense of the missile submarines.

Views regarding the US Navy's ideas for fighting the Soviet Union can be divided into three perspectives: the Naval Warfare perspective, at the level of the Naval commander-in-chiefs, planners, and submarine commanders; the International Security perspective of the highest level of the Navy, the Office of the Secretary of Defense, and parties concerned with arms control; and the Political Control perspective. Those concerned with Naval Warfare look for the feasibility of the operations suggested by the Navy's strategy. Those responsible for the International Security implications of the strategy look at its probable

Our new associate, Tom Stefanick, has authored the main article in this report, on the issues surrounding the use of U.S. attack submarines in antisubmarine warfare. There is the possibility that an aggressive approach to ASW is being built into U.S. plans. Designs for their use would have them executing a full-court press in the event of hostilities in Europe—a maneuver that would threaten Soviet ballistic missile submarines and, possibly, their bases in an effort to force Soviet attack submarines into a defensive, rather than an offensive, posture. This article is drawn from the author's forthcoming book on strategic anti-submarine warfare, to be published in October 1986 by Lexington Books.

Whether this is a sound military maneuver turns on a number of factors which Stefanick discusses. Whether a U.S. President would want to execute this maneuver depends, presumably, on the war scenario and cannot be determined in advance. Whether a President would have any choice if these options are built into U.S. plans is still another question.

The Federation has been much immersed, during the last two months, on SALT related issues, not to speak of those involving Star Wars—reporting on this will await the September issue after the summer lapse of two issues.

In the meantime, we have reported on Libya and War Powers and on a visit to Central America on behalf of its scientists which we sponsored in April. —JJS

impact on deterring the Soviet Union in comparison with alternatives, its impact on crisis stability, and on routes to escalation. The Political Control perspective sees strategies as ideas that must be implemented or avoided by political leaders, and looks for those elements in strategy which are flexible and can respond to political control, as opposed to those which are more automatic and less flexible.

This report questions the US Navy's official thinking from all three perspectives. From the Naval Warfare perspective, Soviet submarine quieting is probably the most important development in the US-Soviet naval balance. As Soviet missile submarines become quieter in the foreseeable future, they become much more difficult to find, and US attack submarines become less effective in this mission. As Soviet attack submarines become quieter in the future, they pose a greater threat to US submarines, particularly in Soviet home waters where they can be supported by other Soviet naval, air, and surveillance assets. The feasibility of the forward attacks by US attack submarines is doubtful in the context of a conflict occurring in the late 1990s.

From the International Security perspective, the problems of the offensive strategy are centered on the fact that it proposes concerted attacks against part of the Soviet nuclear deterrent at the beginning of a conventional conflict, perhaps a small one, at a time when it might not be clear whether the conflict could be contained and defused. It is not likely that the attack on missile submarines could apply much pressure for the Soviet leadership to terminate such a conflict, particularly in the most critical circumstance of clashes in central Europe. Money spent on improving defense in central Europe is more likely to effect the Soviet calculations of whether to engage in, or terminate fighting.

Political leaders should be aware that the forward movement of US attack submarines into Soviet home waters is expected to occur rapidly during or even prior to the initiation of hostilities. While proponents of the strategy say that this will prevent the Soviet attack submarines from coming into the North Atlantic, such moves minimize the time available for political leaders to attempt to resolve the crisis. The sudden insertion of a large number of US attack submarines into very sensitive Soviet waters might undermine diplomatic maneuvers. But would the President have an opportunity to choose whether the attack submarines were sent in? How quickly and safely could he withdraw them if they were doing more harm than good? What kinds of options is the offensive strategy going to give the President? What if the President rejects the option of moving attack submarines forward? Does the current planning provide forces, training, and tactics to accomplish more defensive sea control objectives?

US Naval Objectives

The US must ensure the use of sea lines of communication during a war in the face of Soviet attempts to deny their use. This is an objective that must be satisfied at the minimum. There are several kinds of threats to the sea lines including the destruction of terminals to make ports unuseable, and attacks on ships at sea by submarines or

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aircraft. There is a range of alternatives for defending the sea lines, from attacking Soviet forces in ports, or home waters near ports, mining near ports, finding and attacking Soviet ships and aircraft as they pass through geographic chokepoints, or defending the targets of Soviet forces. Another approach is to attack a particular land area or set of forces that the Soviets value so highly that they will want to defend it (them), preventing the forces used in the defensive mission from attacking sea lines.

The options thus fall into four basic approaches. The first approach is to tie up forces in the defense of valuable assets, i.e. Soviet coastal bases and ballistic missile submarines; the second is to attack Soviet forces on forward areas and form a forward blockade in the Barents Sea; the third is to form barriers at chokepoints such as the Greenland-Iceland-United Kingdom gap; and the fourth is point defense of ports, carriers, and supply ships using armed escorts.

The Emphasis on ASW

The Secretary of the Navy has stressed the importance of forcing the Soviet Navy to defend their SSBNs. "We have to move up north of the GIUK (Greenland-Iceland-United Kingdom) gap. We have to control the Norwegian Sea and force them back into the defensive further north, under the ice, to use their attack subs to protect their nuclear missile submarines, to use their attack subs to protect the Kola and Murmansk coasts, and similarly their Pacific coast as well. If we try to draw a 'cordon sanitaire' and declare that we are not going to go above the GIUK gap or we are not going to go west of such and such a parallel, then, obviously, they have the capability to use their attack subs offensively against our SLOCs [sea lines of communication]. This is one issue that people keep raising, the GIUK gap versus the North Cape [near the Soviet Arctic bases]. It should be clear to everyone that if the NATO treaty means anything, it means that we have to protect and to hold Norway... If we allow the Norwegian Sea to be controlled by the Soviet Union, Norway is untenable."

This is the basic expression of the choice between the defensive strategy and the offensive one. The main assumption is that the only way to keep Soviet submarines away from the SLOCs is to threaten or attack the missile submarines. The Naval Warfare perspective is, for obvious reasons, dominant in this statement, but there is also a nod toward the International Security perspective, in that forward operations are deemed necessary to keep the Alliance healthy.

Secretary Lehman usually includes the defense of northern Norway as one of the fundamental constraints that locks the US into an offensive strategy. However, the threat to northern Norway is probably manageable without a major US naval buildup and offensive strategy. According to Worth Bagley, formerly an Admiral and Commander-in-Chief US Naval Forces Europe, "as long as Norway restricts her national forces to defense, and makes that defense credible, an invasion of Norway is of questionable usefulness to Moscow. Soviet attack forces would have to be sizeable. The depth of defense for Soviet territory that would be gained in Norway is limited. Norwegian airfield

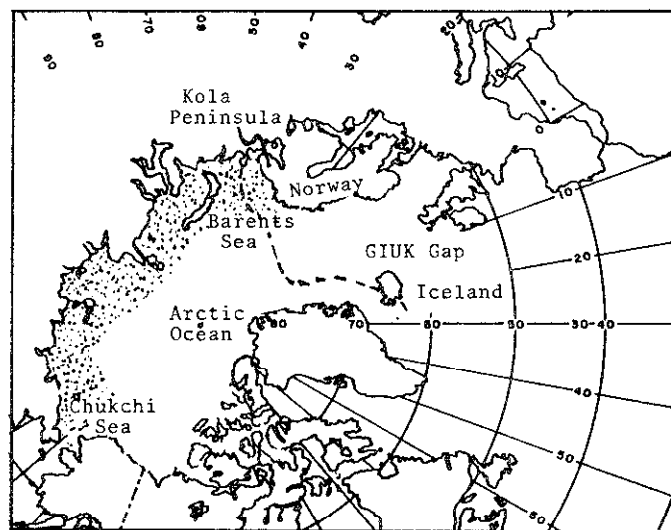


Figure 1: Polar projection map of the Arctic. Shaded area is less than 1200 feet deep. Dashed line indicates approximate extent of winter pack ice. Source: Author.

capabilities offer little additional capability to long-range Soviet aircraft and require logistic supply. Soviet aircraft placed in Norway would be exposed to attack and strong defenses for them would have to be established."

The defense of Norway is probably more sensitive to the rate at which Finnish and Norwegian forces can mobilize, which would be on the order of 72 hours. For the US Navy to "nullify" the Soviet attack submarine force in the Norwegian Sea, in preparation for moving carriers and amphibious troops northward, "it may take a week or it may take a month or 3 months", according to Secretary Lehman. In any case, Norway is already acquiring 72 F-16s for air defense, and each US aircraft carrier would provide 20 F-14 and 18 F/A-18 fighter/attack aircraft. Why not fly the equivalent number of aircraft to southern Norwegian bases at the beginning of hostilities?

In short, the Soviet "intentions" threat to Norway seems small, the possibility of denying the Soviet Union any useful gain from taking northern Norway seems great, and the possible contribution to the immediate defense of northern Norway by US forces based on carriers or sealifted Marines seems small. It is interesting to note that Norway's entire security policy is oriented around avoiding the development of forces that might threaten the Soviet Kola Peninsula, with its strategic submarine bases. From the International Security perspective, it is deterrence and reassurance in roughly equal measure. The US maritime strategy may topple the very balance that the Norwegians attempt to maintain, by directly threatening Soviet SSBNs and the Kola.

The strongest remaining argument for the early forward movement of US attack submarines against Soviet missile submarines is to tie them up and therefore help neutralize the threat to the sea lines of communication. Again the Navy Secretary, as quoted by a Navy submarine chief, said "Particularly in submarine warfare, unless a forward strategy is employed at once to force the Soviet submarines to

protect their strategic missile forces and the approaches to their home waters, Soviet superiority in numbers would well determine the outcome of the war." Former Chief of Naval Operations Admiral James D. Watkins has expressed a similar view. "The Soviets expect us on warning [of an approaching conflict] to surge SSNs. They know we are going to the bastions. They know we can get inside their knickers before they can find us and they don't like it." Once inside those knickers the US attack submarines would "wage an aggressive campaign against all Soviet submarines, including ballistic missile submarines."

Roles of Submarines

Submarines have unique characteristics which make them valuable in several roles in modern navies. They can carry a great deal of firepower, and are very difficult to detect. Radar and other electromagnetic radiation used to detect ships, aircraft, and spacecraft cannot be used to detect submarines directly. Nuclear power plants and air purification systems have extended the undersea endurance of the submarine to the point that it is limited mainly by the amount of food that can be stored and by the amount of time that crew members can remain effective while living in a steel tube 35 feet in diameter. The US has placed about half of its long range strategic nuclear warheads in submarines called SSBNs, and the Soviet Union keeps about a quarter of its strategic warheads in SSBNs. Submarines designed to fire torpedos at other submarines or at ships are called attack submarines, or SSNs, and those primarily intended for launching cruise missiles are called SSGNs. In the US, the function of the SSGN is included in many of the SSNs, whereas the Soviet Union has built separate classes of SSNs and SSGNs.

Attack submarines (including SSGNs) can carry out a variety of tasks, including launching cruise missiles against land and surface ships, destroying other attack submarines with torpedos and rocket propelled depth bombs, and destroying SSBNs with the same weapons. The US has about 95 nuclear powered attack submarines, and the Soviet Union has about 115. In addition the Soviet Union maintains about 150 attack submarines which are powered by diesel

engines when on or near the surface, and limited rechargeable battery power when deeper underwater. These submarines can travel long distances on noisy diesel power, as they did during World War II, but are best suited for operating in barriers nearer home, where they can maximize the use of quiet battery driven motors. In a barrier type naval strategy, and in the point defense of the termini of the sea lines, these non-nuclear submarines can be potent and very cost effective. They are less able to support point defense of rapidly moving shipping, and are inadequate for forward blockade type operations near or in heavily defended waters.

Submarines are complex systems, and technical comparisons between them depend a great deal on the specific military context in which they might be employed. There are several characteristics which are of general importance. The amount of sound generated by the submarine is probably the most critical, since sounds of very low intensities—less than 1 watt—travel long distances in the ocean and can be detected by passive sonar systems which "listen" for such sounds. Speed is useful for travelling long distances through relatively safe waters, but the sound generated by the submarine hull and propeller can increase dramatically at speeds above 5 to 8 knots, making the submarine more vulnerable to detection.

In a war, the attack submarines of both navies would be faced with a number of tasks. The US would seek to maintain secure sea lines of communications with Europe in a long war, and would attempt to protect US surface warships and supply ships directly. The Navy would also destroy the Soviet attack submarines as they approached those sea lines, and would attack Soviet forces in their home waters. The Soviet Navy would attempt to protect its home waters from the intrusion of US attack submarines in order to defend SSBNs, surface ships, and land bases. They might also attempt to interfere with the US resupply of Europe and Japan by attacking the sea lines or the ports. Both sides must allocate a limited number of resources to these missions, and there is some flexibility in this allocation, in spite of the fact that the areas are widely separated.

The Arctic Battleground

US declaratory strategy for fighting war at sea has for many years contained the themes of attacking bases and containing the Soviet navy within limits defined by maritime chokepoints. The geographic position of the Soviet Union and its limited access to warm water ports is a major reason for this. The map in figure 1 shows that in order to reach the North Atlantic Ocean, Soviet ships leaving the Northern fleet bases on the Kola Peninsula must travel over 1500 miles past Norway, Sweden, Denmark, Iceland, the United Kingdom. The gap between Greenland and Iceland is less than 200 miles wide, and the gap between Iceland, the Faroe Islands and Scotland is about twice that distance. This chokepoint would be a focal point of operations aimed at limiting Soviet access to the Atlantic using a barrier type of strategy.

The recently articulated idea of tying up Soviet forces by attacking missile submarines is not fundamentally new. It is the merger of two preexisting ideas about fighting the

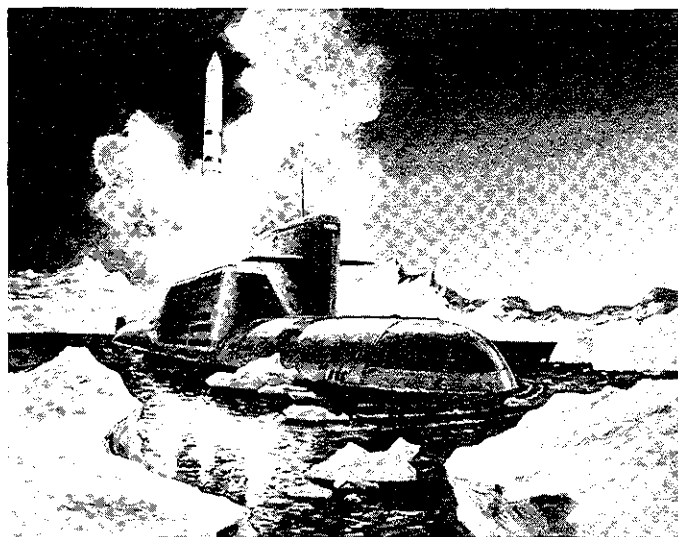


Figure 2: Soviet submarine firing through a hole in the ice. Source: US Navy.

Soviet Union: protecting the flow of supplies to Europe and nuclear damage limitation through strategic antisubmarine warfare (ASW). Sinking missile submarines is a tactic for attempting to limit, in a meaningful way, the human and industrial damage caused by a general nuclear war. Damage limitation policies attempt to shift nuclear strategy from acceptance of the existence of a situation in which each side holds the other hostage, toward fighting and winning a nuclear war. From the International Security perspective, there has long been concern that strategic ASW destabilizes the mutual hostage relationship, and increases the likelihood of nuclear launch in a crisis.

In the mid-1960s, an effort was made within the US government to describe US policy as an acceptance of the fact that both the US and the Soviet Union could maintain sufficient destructive power to destroy the other side, even after a first strike. For a number of years after, strategic ASW was rarely mentioned in the Navy's public statements, and was never offered as a centerpiece of naval strategy, as it is now. The great deal of interest and activity in sinking Soviet missile submarines remained, but was not directly used as a rationale for procuring forces. It is possible that one reason Navy and other Defense Department officials are less shy about mentioning strategic ASW is because the discussion regarding nuclear strategy has become more open to damage limiting concepts, partly as a result of the Strategic Defense Initiative (SDI). The SDI, or Star Wars program, is partly an attempt to build the ultimate in strategic defense. The Chief of Naval operations has even referred to the new design of attack submarine as the Navy's "Star Wars equivalent for the year 2000", in reference to its advertised ability to threaten Soviet SSBNs.

Shifting the Nuclear Balance

Therefore, another objective of the attacks on Soviet missile submarines, beyond tying up the Soviet Navy, is to gain a politically useable shift in the strategic nuclear balance during the course of a US-Soviet conflict. That shift would be used to induce the Soviet Union to stop fighting the US, for fear that if war were to escalate, the Soviet Union would be at a disadvantage in strategic nuclear forces. According to Admiral Watkins "As our maritime campaign progresses, and as the [Soviet] nuclear option becomes less attractive, prolonging the war also becomes unattractive, since the Soviets cannot decouple Europe from the United States and the risk of escalation is always present. Maritime forces thus provide strong pressure for war termination that can come from nowhere else." In a wartime scenario where Soviet forces are making significant gains in Western Europe, however, it seems unlikely that the loss of some missile submarines would induce the Soviet leadership to halt or withdraw.

Other themes that arise in connection with, and support of, this forward attack submarine strategy are the importance of moving US attack submarines to sea early in a war, or even prior to the beginning of a war, and the role of uncertainty in the threat to Soviet SSBNs. The Soviets generally keep about 15 to 25 percent of their missile submarines at sea, and perhaps another 25 percent on alert in

port, where they also have protective shelters for submarines. If they were to move most of their SSBNs to sea in anticipation of a war, the ability of the US to find them would be greatly diminished.

The Navy's tie-up strategy therefore calls for getting US attack submarines in those waters early. Since the Soviet leaders would not know how many US submarines were in the area, it is expected that they would make a worst case assessment, assume a large threat, and plan their defenses accordingly, that is, hold back a large number of attack submarines in the defensive mission. In the words of Admiral Kinnaird McKee, the Director of the Office of Naval Nuclear Propulsion in the Department of Energy, "a handful of submarines operating in the other guy's back yard are going to tie up forces far out of proportion." On the other hand, the Chief of Naval Operations has testified that most United States attack submarines would move forward.

The very rapidity of these operations raises questions from the Political Control perspective. The President might be advised that he absolutely had to send attack submarines forward quickly in the midst of a crisis. From the Naval Warfare perspective, an offensive strategy requires this—just as the tensions were building. A President, trying desperately to keep those tensions from erupting into direct conflict between the US and the Soviet Union, would be looking for ways of keeping close contact with forces deployed near the Soviet Union. The attack submarines would not only go very near the Soviet Union, but would be difficult to communicate with without risking their security. Estimates of the maximum number of attack submarines that could move into Soviet home waters depend on how many can go to sea at any given time, how many are used to defend aircraft carriers, and how many are used in the Greenland-Iceland-United Kingdom gap. With about 50 US attack submarines in the Atlantic, 80 percent at sea in a crisis, between 7 and 14 covering 7 aircraft carriers, and from zero to 10 submarines in the GIUK gap, there might be as many as 20 to 30 attack submarines in the Soviet home waters. That is a large number of US submarines to "tie up."

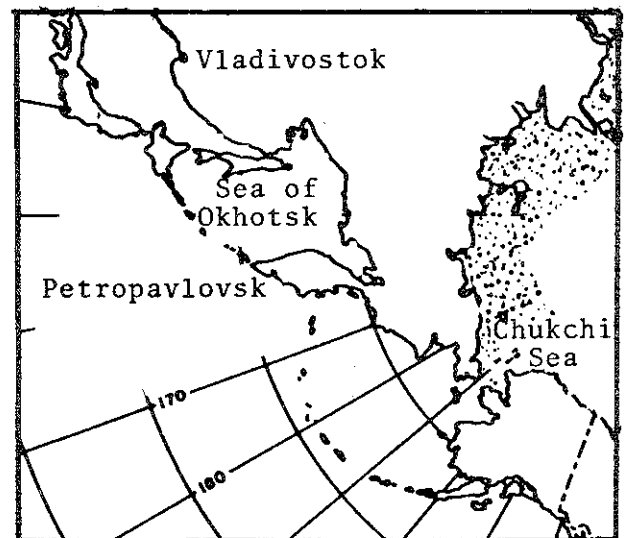


Figure 3: View of the northwest Pacific, showing Soviet SSBN operating areas in the Sea of Okhotsk. Source: Author.

Apparently, the success of the tie up strategy rests on a kind of bluff. It might be hoped that the uncertainty in the minds of Soviet leaders regarding the degree of threat to their SSBNs will force them to assume the worst. If there were to be other demands on US attack submarines, the tie up strategy might depend on this bluff. On the other hand, defensive strategies, particularly the barrier approach, rely on direct attrition of Soviet vessels, and as such relies less on this element of bluff and Soviet perception. From the Political Control perspective, this situation may be difficult to handle diplomatically. If an attempt to disengage forces is made, in order to avoid further escalation, the promise that US attack submarines are withdrawing might not be believed. The uncertainty of the threat, which is a bonus in the Naval Warfare perspective, may well be a problem from the Political Control perspective.

A Dangerous Hunt

If the Soviet Union is to be expected to retreat in the face of the threats from US antisubmarine warfare efforts, it would have to be faced with a credible threat from the US, and would have to see itself as unable to blunt this threat with anything less than a major defensive deployment of naval forces in home waters. Are there other means of foiling the US strategic ASW campaign? How quickly does the US have to sink Soviet SSBNs in order put pressure on the Soviet leadership? How many US attack submarines must be tied up in the strategic ASW campaign, and for how long? How many US attack submarines might be lost?

The available evidence suggests that the Soviet Navy could, with warning of an impending war, put well over 50 percent of their 62 ballistic missile submarines to sea within a few days. Twenty of these 62 are Yankee class with short range missiles that must approach the US coast in order to come within range. It would take US attack submarines, surging out of ports on the east coast, at least five days to reach Soviet waters, so even if the Soviet Navy had only the warning of a very visible US surge, they could beat the US to the Arctic waters by at least several days. Once out into the Arctic, they could take advantage of the expanse of the deep central Arctic basin, or hide in the shallower waters of the wide Soviet continental shelf. The area on the shelf over which the water depth is between 120 and 1200

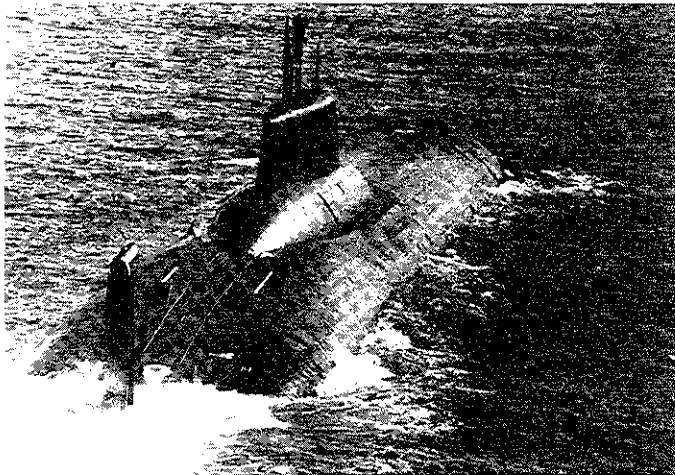


Figure 4: Soviet Typhoon class ballistic missile submarine. Source: US Navy.

feet is over 800,000 square nautical miles. (See shaded area in figure 1.) Soviet missile submarines could conceivably enter the Beaufort Sea or Canadian Archipelago off the coast of Canada. The US would be forced to conduct a search of a major part of the Arctic to find these elusive vessels.

A search for Soviet SSBNs by US attack submarines would probably require the US to divide the Arctic into smaller zones, and send one US attack submarine into each zone. If the attack submarines were mingled together, they might occasionally attack one another. This method of assigning one submarine per zone is a concept already envisioned for submarine barrier operations in the Greenland-Iceland-United Kingdom gap for similar reasons. Within each zone, the US attack submarine would patrol in a search pattern at a speed of 5 to 10 knots, in order to minimize its own sound output and maximize the effectiveness of its sensors.

Passive acoustic sensors would be the most likely choice of sensor, since active sonar could be heard by the Soviet SSBNs at ranges two to eight times farther than the sonar could detect the Soviet submarine, allowing it ample opportunity for evasion. The detection performance of passive acoustic sensors in the Arctic waters is therefore a crucial factor in an assessment of the feasibility of the forward strategic ASW strategy. Passive sensor performance depends on the environment, on US systems, and on Soviet submarines.

Passive Sonar Detection

The shallow water of the 600 mile wide Soviet Arctic shelf does not carry sounds efficiently. As the sound from a submarine travels, it bounces between the surface and the bottom, where it is absorbed at each bounce. Consequently, the range at which a quieter submarine can hear a noisier one is lower than it would be in deep water, where the losses are less severe. Thus by engaging Soviet submarines in shallow water, the US loses some of its important detection range advantage, relative to the advantage it holds in deep water.

The noise generated by surface shipping, ocean drilling, wind, waves, organisms, rain, and ice is called ambient noise. Ambient noise in the same frequencies as submarine sounds can partially mask submarine sounds. Ambient noise power is distributed over a broad band of frequencies, but within any given narrow band there is much less noise power. Sounds from quiet submarines are emitted in a small number of narrow bands, so that by listening to narrow bandwidths all across the spectrum, it is possible to maximize the ratio of signal to noise in the narrow frequency bands emitted by the submarine. Even with this gain, higher ambient noise levels can limit detection capability. Noise under ice can be five to ten times louder than noise in open water, especially when the broken edge of the ice pack is nearby, high winds are blowing, and the temperature is falling rapidly causing stress cracks. The noise levels under ice can also be hundreds of times quieter than in open water when there is a continuous ice cover, slowly rising temperatures, and low wind speed. Noise levels under ice can change by a factor of a thousand over

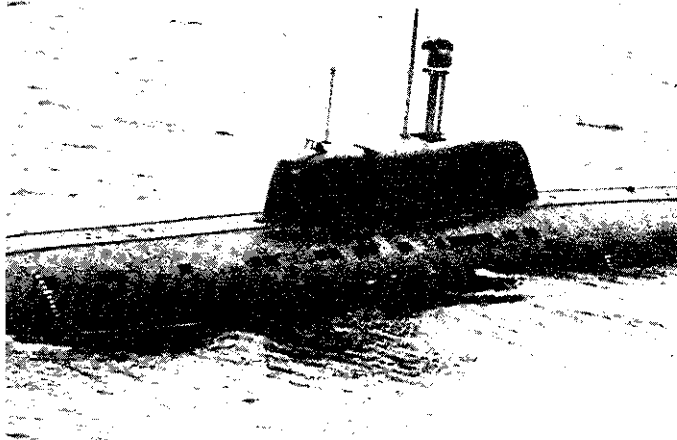


Figure 5: Soviet attack submarine. Source: US Navy.

the course of a day.

Sonar antennas, called arrays, can improve detection capability by listening in one direction at a time, and excluding noise arriving from other directions. If a submarine lies in the direction toward which the array is electronically steered, then the chance of hearing it is maximized because the only noise entering the array is the noise that lies in the direction of the submarine.

The ability of sonar systems to discriminate submarine sounds from noise is in practice limited by the effects of the ocean's variability. It appears very unlikely that major improvements can be made in the ability of sonar systems to improve the ratio of submarine sound to ambient noise. The Soviet Navy will be able to reduce the sound output of their SSBN fleet faster than improvements in US sonar systems will be able to keep up with them. The net effect of this is that the detection range of US sonars against Soviet SSBNs will continue to decrease, and therefore the time required to search for a Soviet SSBN in a given area will continue to increase.

Soviet Submarine Quieting

The sound levels radiated by nuclear powered submarines has been steadily decreasing since 1960, as shown in figure 7. Soviet sound levels remained relatively high throughout the 1970s, but have begun to decline, and are now approaching the levels of older US submarines still in active service. In particular, the Victor III attack submarine represents a major advance in Soviet quieting. The new Akula SSN may be a further significant improvement. These two classes, and others, would be involved in the defense of Soviet SSBNs. Only the most recent class of US attack submarine, the Los Angeles (SSN-688), holds a significant acoustic advantage over these new Soviet vessels. New Soviet SSBNs of the Delta IV class may be approaching the previous US generation of SSBN, the Lafayette class, in quietness. The detection ranges of passive sonars against Soviet submarines can be estimated using a range of environmental conditions, both favorable and unfavorable to detection.

In the shallow waters of the Soviet continental shelf, shown as the shaded portion of the map in figure 1, Soviet SSBNs-of the Delta IV or Typhoon may be detected at ranges on the order of 2 nautical miles under poor detec-

tion conditions, to 50 miles under very favorable conditions. To sweep through the 800,000 square nautical miles of the shelf region, at a very high search speed of 20 knots (typical speeds are less than 10), would require 20 US attack submarines nine weeks under poor detection conditions, and about two days under favorable detection conditions. However, since conditions would vary over the course of a search, the expected search time might be on the order of a month. It is important to keep in mind that this estimate takes no account of possible Soviet countermeasures.

The tremendous variance in this estimate, driven largely by uncertainty in the environment, is characteristic of most predictions of detection rates in ASW operations. The estimates assume no Soviet defense against US attack submarines, and no attrition to US attack submarines in engagements with Soviet SSBNs, both of which are highly unrealistic assumptions. It is only the time required to search an area for randomly moving targets, and attain a 95 percent confidence of detecting them.

Every realistic factor which is ignored in the estimates above increases the time required to actually sink Soviet missile submarines. The time required to trail a detected submarine, move into torpedo range (which is probably less than ten miles under ice in shallow water), launch a torpedo, and resume searching, may require many hours. The Soviet Navy can be expected to employ at least a few SSNs to protect SSBNs, and the US submarine may have to engage two separate adversaries simultaneously. The Soviet Navy can also be expected to use mines and diesel/electric powered submarines at barriers, both of which are difficult to detect, and very hazardous. Soviet fixed surveillance on the sea floor and on the ice can clue Soviet forces as to the location of some US attack submarines.

Decoys which sound like Soviet SSBNs can easily be spread throughout the region, and the US submarine would have no choice but to engage each one of them, greatly increasing the search and engagement time. Placing mines around these decoys would create a series of terrible traps, and for US submariners, the psychological impact of knowing that such traps exist might be profound. In particular, it could inhibit some of the aggressiveness upon which the strategy depends. If the US attack submarine assigned to a particular zone were destroyed, particularly under the ice, there might be little way of knowing for days. The likelihood of encountering a large number of Soviet diesel/electric submarines and mines is a feature of the offensive tie up strategy. The barrier approach in the Atlantic permits NATO to reverse the situation and force the Soviet attack submarines to encounter mines and large numbers of attack submarines.

Could the Soviet Navy Rely on Defenses?

This pessimistic assessment of the technical feasibility of a US ASW campaign does not answer the questions of how the Soviet leadership would react given an uncertain threat to their SSBNs. How much would they know about the attrition rate of their missile submarines which are most secure when they broadcast no information? They might carry a buoy which would rise to the surface and broadcast

a radio signal if the submarine sank, although under ice this would be unlikely to function. US missile submarines carry a "depth and destruct" buoy outside the hull, which is probably to alert the US authorities of the submarine's location in case of a catastrophe. If operating near Soviet acoustic surveillance, Soviet SSBNs could broadcast an acoustic signal if they sank. The SSBNs might be required to send a short radio message periodically, although this would force them to either break ice or find a patch of open water. The tradeoff between the moderate risk of detection of a brief communication and the improvement in positive command and control may make this seem like a reasonable tactic in the view of the Soviet leadership.

The SSBNs are very important to the Soviet leadership at its highest levels, not just to the Soviet navy, which in some ways might prefer not being tied to the defense of these forces. Between 1957 and 1975, 40 percent of the investment value of all Soviet combatant ships was in SSBNs. Over the past ten years, the investment value of SSBNs and their missiles has been three times as much as the total value of land based missiles, bombers, and air launched cruise missiles. This in spite of the fact that sea based forces provide only one quarter of their warheads which can be delivered over a long range. The unique features of the SSBN are so valuable to the Soviet Union, even with their limited accuracy and hard target capability, that at any given time, the investment value of a warhead deployed at sea is six times that of a warhead on land based missiles or bombers. On top of this, they seem to have been willing to assign a large portion of their ocean going fleet to the defense of these sea based warheads.

At the same time, the Soviet leadership, faced with the possibility of a long war in Europe, is probably deeply concerned about their ability to disrupt the flow of supplies across the North Atlantic. Any means of defending SSBNs in home waters and allowing some SSNs to attempt to penetrate the GIUK gap into the North Atlantic would probably be seen as an important advance, although it is important to note that Soviet declaratory policy seems to rank disruption of US shipping second to defense of the SSBNs and providing for nuclear strike capability. As Soviet submarines become quieter, both of these objectives are served: SSBNs are more difficult to find and are therefore more secure against passive acoustic detection, and Soviet SSNs are better able to pass into the North Atlantic.

Other forms of defense would lessen the need to allocate SSNs to the defensive mission. Mining, diesel/electric submarines, and undersea surveillance would to some extent take the place of the Soviet SSNs. Surveillance may be in the form of fixed passive sonar sensors, fixed active sonar, magnetic detectors on the ice or the bottom, airborne laser detectors, wake detectors, or thermal detectors. While these technologies are difficult to implement over large areas distant from home, in the surveillance of limited areas at specific barriers, they are much more feasible. If tied to surveillance systems through command and control, existing Soviet naval forces could pose a threat to US attack submarines in the area.

War Termination or Use of Nuclear Weapons?

The other main objective in US declaratory maritime strategy is to destroy Soviet strategic forces as a means of pressuring them to terminate hostilities. As the Soviet Union sees its vitally important strategic reserve forces sunk, the argument goes, it will see its nuclear warfighting position erode toward an unfavorable position, and will stop the war before that point is reached, rather than risk going to nuclear war with an adversary that has improved its relative nuclear posture. This objective depends on US developments in other capabilities, such as MX, Trident II, the sea launched cruise missile, the Pershing II, and the ground launched cruise missile. These capabilities are being built and fielded during the late 1990s when the new US attack submarine, SSN-21, will be deployed. The Strategic Defense Initiative can be seen in this light as an attempt to enhance US ability to threaten to win a nuclear war.

To the extent that the Soviets could defend their sea based strategic reserve, and to the extent that they could diversify their reserve force to include sea launched cruise missiles, land based mobile systems and other survivable systems, the pressure for war termination induced by the US forward attack submarine strategy decreases. The Soviet Union seems to be moving in these directions already, although it is too early to tell if such programs represent such a diversification.

A major paradox lies at the heart of US declaratory strategy. It proposes that sinking SSBNs will pressure the Soviet Union to respond with extraordinarily submissive behavior: to terminate war on US terms, give up war aims, tie up naval forces in home waters. Yet implicit in the strategy is the assumption that attacks on Soviet SSBNs are not likely to lead to the use of nuclear weapons because the Soviet Union would not be overly concerned about the threat, relative to its concerns as a land-oriented power.

A military rationale for Soviet use of nuclear weapons to protect SSBNs is somewhat difficult, though certainly not impossible, to envision. The threat to Soviet SSBNs would be primarily SSNs, which would be difficult to find. If a US attack submarine were detected by a surveillance system in shallow water, the choice to use a nuclear depth charge

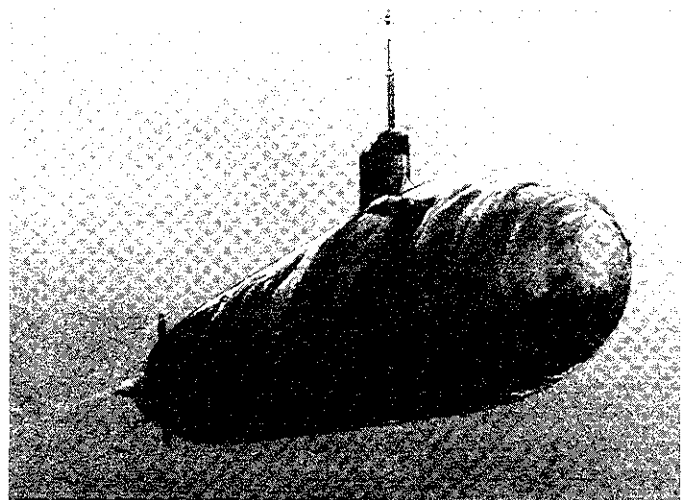


Figure 6: US attack submarine, SSN-21. Source: US Navy.

might be made on the grounds that torpedos have difficulty tracking targets in shallow, reverberent waters. The resulting sound from a nuclear explosion would probably die out within a few hours, and would not spread as far in shallow water as it would in deep water. The very properties that make shallow Arctic waters good places for Soviet submarines to hide, also increase the military utility of nuclear ASW weapons relative to conventional weapons.

The use of nuclear weapons in the Soviet Arctic, far from any other land mass, against a specific target carrying out a specific mission, may not be seen by the Soviet Union as a widening escalation of the war—if done by them. After all, what would the US response be to such a limited nuclear use? It is entirely possible that the US political authorities would be in the position of having to choose whether to escalate to a wider use of nuclear weapons. At the level of the individual submarine commander, the apparent initiation of nuclear warfare, and his position in the midst of it, opens a set of difficult questions. Can he still communicate with the National Command Authorities? Has the deterrent effect which is attributed to the nuclear weapons on his own submarine failed, and how does he respond?

It seems unlikely that the Soviet leadership would see many incentives to launch submarine missiles against US targets on land, since that would probably invite nuclear strikes against the Soviet homeland. The objective of avoiding nuclear attacks on the homeland would seem to outweigh the "use or lose" argument for launching missiles, at least at the highest political levels. At the level of the Soviet submarine commander, it is much more difficult to say, since the sinking of his submarine is the end of the war for him and his crew.

Conclusions

The declaratory maritime strategy emphasizes moving US attack submarines into highly defended Soviet waters, against increasingly stealthy targets. Advances in US sonar technology is unlikely to recover the ability to detect Soviet submarines at long ranges, particularly in shallow waters where the Soviet SSBNs will be. For the past twenty-five years, the US has maintained an acoustic advantage over Soviet submarines, which has yielded a major tactical advantage over the Soviet Navy. The acoustic advantage of the US submarine fleet as a whole is beginning to erode slowly, and shallow water operations within a few hundred miles of the Soviet coast would minimize the US advantage in submarine vs submarine warfare.

The forward movement of many US attack submarines would result in the loss of some to defenses such as mines, diesel/electric submarines, aircraft, and possibly surface ships. As Soviet submarines become quieter, passive acoustic detection may have to give way to active detection, which would make even the quietest US attack submarines very vulnerable to detection. The Soviet Union might see the use of tactical nuclear antisubmarine weapons as a threat which could be carried out without leading to a major escalation, so it may be seen as a plausible and militarily prudent response to US strategic ASW. Early aggressive attacks on the most valuable Soviet long range

"You have seen a 688 class submarine. It is a mean looking machine. They are paranoid about that big black submarine . . . Uncertainty is the most damaging element in the planners' book. It just drives them nuts. In submarine warfare, we bring uncertainty to the table like nothing else."

**Admiral Kinnaird R. McKee,
before the Senate Subcommittee
on Strategic and Theater
Nuclear Forces, Committee on
Armed Services. May 4, 1984.**

nuclear force (in terms of investment) already broaches a vague area between conventional and nuclear war.

The tie-up and forward barricade approaches, unlike the others, do not allow US ASW forces to operate together with NATO air and surface forces, and surveillance. Radio communications are less likely to be jammed or detected in waters farther from the Soviet Union, so command and control between many of the ASW forces in a barrier, or acting as a point defense, would be more reliable.

In addition, the tremendous cost of a general nuclear war means that even a small probability that attacks against SSBNs directly increase the likelihood of such a war weighs heavily in the overall assessment of anticipated cost of the strategy.

As expected, the offensive naval strategy looks very different from different perspectives. The more effective the threat to Soviet SSBNs, the better it looks from the Naval Warfare perspective and from the perspective of those who believe that International Security is increased by the ability to partially disarm the Soviet Union. For those who believe that the mutual hostage relationship is a sad fact, but preferable to trying to win a nuclear war, the more effective strategic ASW is, the worse off we are. From the view of Political Control, the more we rely on strategic ASW to yield an advantage in Naval Warfare by tying up the Soviet Navy prior to or during a conflict, the less control the President may have over the process.

There is virtually no hope of trying to get the best out of forward attacks by SSNs in a forward barricade, while avoiding Soviet SSBNs. Technical analysis and consideration of tactics strongly suggest that Soviet SSBNs could not be distinguished from Soviet SSNs in a reasonably safe manner by US attack submarines. Vice Admiral Lee Baggett has testified "I think [trying to distinguish SSBNs from SSNs] would be a stricture that would be very, very onerous from the standpoint of ASW. I don't believe you could make a distinction in a combat environment—even prehostilities—with certainty to distinguish between SSBNs and attack submarines. It is going to get worse in the future with the [Soviet] quieting trends . . . regardless of our capabilities."

The Navy budget cannot continue to expand at its current rate, and already shortages in aircraft carrier escorts

are predicted. Advanced attack submarines will be needed, but the force goal of 100 attack submarines will be extremely difficult to meet as attack submarine costs increase. The US must emphasize a balanced approach to protecting the Atlantic from the quiet Soviet submarine fleet of the 1990s. Such an approach would take maximum advantage of the geographic barriers between the Arctic and the North Atlantic and maximum advantage of the potential for surveillance in waters adjacent to allies, and would reduce the current emphasis on submarine operations in waters heavily defended by the Soviet Union.

—Tom Stefanick

LIBYA AND THE WAR POWERS

The bombing of Tripoli constituted the most flagrant violation of the spirit of the War Powers Act thus far.

There was, after all, no question that American forces were, indeed, headed for "hostilities"—in fact an act of war. The War Powers Act requires the President "in every possible instance" of this kind to "consult with Congress" in advance. The President had, in this case, consulted so widely outside the Congress, even in Europe, that the papers were full of the issue for days. So there was no

(Continued on page 11)

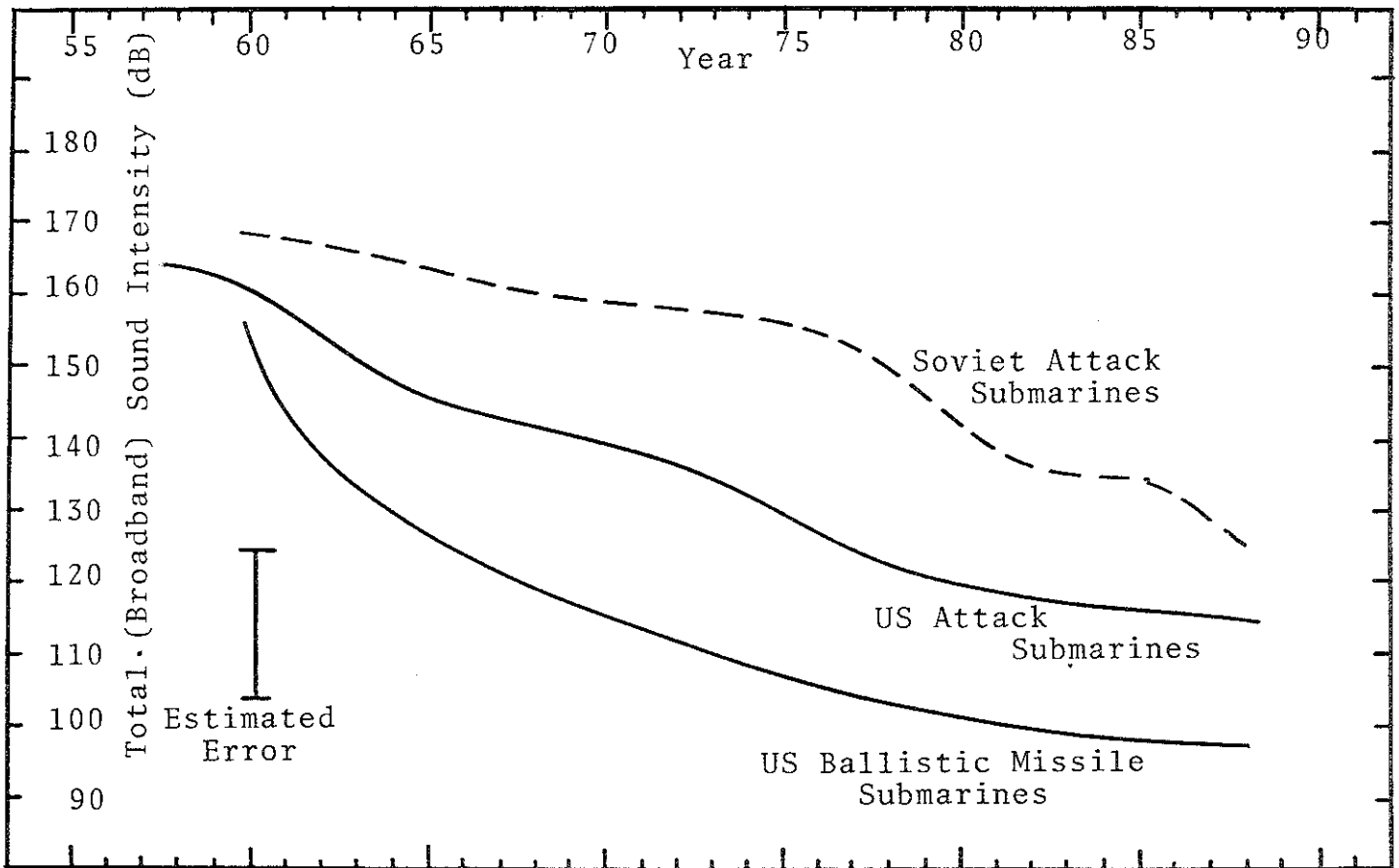


Figure 7: Trends in Soviet and US submarine quieting. Source: Author.

question of his capacity to consult in timely fashion. And the "self-defense" theme the President invoked could hardly be invoked in a more arguable case since it involved attacks on American civilians abroad rather than on the Nation itself or its forces and was based on intelligence information linking the acts to Libya rather than more overt activities.

Nevertheless, Congress was not asked for any kind of approval for America's action until three hours before the bombs landed. As House Foreign Affairs Committee Chairman Dante Fascell noted in subsequent hearings, "we were notified that the 'whole operation was in effect' half-way through a briefing that went from 4:00 p.m. to 5:45 p.m. and the planes attacked at 7:00 p.m."

As Fascell recounted it, as a way of complying with the War Powers Act, the delegation was told: "Yes, the whole operation is in the air but if you want us to call them back, we can."

The Administration's defense of its position in Fascell's later hearings was openly insulting. Abraham D. Sofaer, a former judge, testifying as the State Department's legal adviser, ended his prepared remarks with these observations:

"The need that some members of Congress feel to defend the Resolution's viability, even in situations well beyond those contemplated at the time of its adoption, causes Congress to shift its concern, deliberations, and political leverage away from evaluating the merits of military actions to testing their legality, and to focus on formal and institutional issues rather than on the substance of our policies."

As Fascell observed, "You are telling us that we are wasting our time worrying about the Constitution."

Sofaer was the butt of some humour since the Committee was well aware that he had earlier authored a scholarly book championing Congress' rights on war powers. His formulations indicated that he considered the President to be his "client." (In fact, the citizenry at large is paying his salary and he works for the Department of State, not the White House. Nevertheless, it is an easy conceit for lawyers who want to excuse themselves for defending indefensible positions to posture themselves as the lawyer for the President—required by the ethics of the bar to put forward every last argument.)

And Sofaer surely did. He even argued that Congress' enactment of an anti-terrorist bill had sent the Executive Branch a "clear message" that Congress wanted these forces to be used and that, accordingly, no further authorization would ever be required under the War Powers Act. One Congressman, wondering whether the funding of the Army would, by the same reasoning, justify a full fledged invasion of Libya was told that, in such a case, the War Powers Act would have to be "taken into account."

Congress Itself to Blame

The War Powers Act calls upon the President to "consult" with Congress without providing a focal point for such consultation. The President interprets this to mean that he can decide when and how and with whom he consults. And because the Act provides that this consultation

should start a 60 day clock running—after which the Congress could pull troops out—the Executive Branch will not engage in any consultations in accord with the Act but only "consistent with" the Act. In other words, whenever an emergency comes up, it defends itself by saying that it did consult in ways "consistent with" the Act but never, in fact, does officially consult.

Congress makes this possible by never designating any official group with which the consultation should take place. And, in any case, by not having such a group, they keep themselves prepared not to have any collective opinion when called upon.

A New Perspective

There is another approach, however. Quite apart from the War Powers Act, Congress needs a leadership committee for national security emergencies that could help ensure that Congress was functioning in such time-urgent national security emergencies as can, in the 20th Century, arise so easily. This is something which Republicans and Democrats could agree upon as clearly in the national interest and in the Constitutional interest of the Congress itself. Obviously such a group would be the logical group to be consulted by the President in the event the President wanted to consult with Congress. But, perhaps more important, the group would be able, if it had an opinion, to consult with the President on its own initiative by communicating its views to the White House.

Moreover, such a group could be created by leadership consensus and announcement; it would not require a statute, much less amending the War Powers statute.

If even one House of Congress adopted this approach, the other would be required to do so so as not to be left out. And, thereafter, the two groups of nine could meet together when desired—and certainly would be meeting together if and when called down to the White House. This approach provides two different foci capable of coming up with, and congealing around, alternative options for emergencies. This should strengthen the Nation's capacity to survive crises. But, needless to say, under this structuring, the Executive Branch would continue to have the unfettered authority to do whatever it pleased. —JJS



Abraham D. Sofaer, State Department Legal Advisor

A LOOK AT PHYSICS IN CENTRAL AMERICA

In April of this year, Bertram Stiller made a two-week visit to Costa Rica and Nicaragua, under the joint sponsorship of FAS and the American Association for the Advancement of Science, (AAAS).

In San Jose, Costa Rica, he visited the Physics Department of the University of Costa Rica. Theoretical elementary particle physics is their chief interest, and they are publishing in the *Physical Review*. But they are unable to expand into experimental research programs because their funding, which comes from the government, has been drastically reduced. They also lack travel grants to be able to attend international meetings in theoretical physics. Their publications and reference library are reasonably current.

Professor Ronald Herrera, the Vice Rector for Research, invited Stiller to visit the National Autonomous University of Costa Rica in Heredia. His interest is in solar energy devices and he expressed great interest in collaborative help. Their teaching facilities for experimental physics are outdated, and their physics journal library is non-existent.

In Nicaragua, Stiller visited the campus of the National Autonomous University of Nicaragua, in Leon. Physicists there have a strong interest in geothermal and other alternative sources of energy, but are in no condition to do much research. They even lack button batteries for calculators, stencils and ink for mimeographing student handouts, etc. No journal library exists and the most recent textbooks are twenty years old. They would also like to invite a physicist to teach geophysics for a year.

In Managua, Stiller met with two West German physicists who were spending a year at the Physics Department of the Managua Campus of U.N.A.N. They are desperate for a volcanologist who could initiate a training program for physics students in the field of volcanology. Again, the journal library was non-existent.

In San Jose, Stiller met with Dr. R. Fernandez, the Secretary General of the Confederation of Central Ameri-

can Universities (CSUCA), to discuss a three-week seminar on the analysis and applications of remote-sensing satellite data. The seminar will be organized under the joint sponsorship of AAAS and CSUCA.

Stiller was told that the U.S.A.I.D. provides funds for physics departments on a highly politicized basis. He discovered that the best-prepared groups, those in Costa Rica, had been refused funds. He also learned that a \$300,000 grant given a few years ago by NSF to the American Physical Society for aid to Latin-American Physics Departments was similarly mis-directed.

Donations of back issues of physics journals through FAS would be of great help to the Central American Universities. Please address any correspondence on this subject to Bertram Stiller, 1870 Wyoming Avenue, N.W., Washington, D.C. 20009.

International Peace Week

Hendrik Bramhoff, of the Department of Computer Science at the University of Hamburg, (FRG) is catalyzing an "International Peace Week of Scientists" from November 10th to 16th at which it is hoped meetings, lectures and seminars will be held by scientists all over the world.

Topics would include verification of arms control measures, strategic defense initiative, comprehensive test ban and so on.

Bramhoff can be reached at 40/4123-5677 or 5672 but the affair is meant to be self-financing and self-arranging; he is seeking simply to stimulate the process. Correspondence and financial contributions may be sent to: Scientists' Peace Week, c/o Kansas Institute for Peace and Conflict Resolution, Bethel College, North Newton, KS 67117. Telephone: 316/283-2500. Contact: Professor Robin Crews.

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