Quiet Soviet Subs Prompt Concern

The latest nuclear attack submarines are stretching the limits of passive sonar detection technology; expert panel urges major shakeup of U.S. antisubmarine warfare programs

In 1985, the Soviet Union launched a new type of nuclear attack submarine, which Western analysts quickly dubbed the Akula, the Russian for shark. It was the sixth new class of attack submarine that the Soviet Navy had built in a decade, but this one turned out to be by far the most disturbing, for it was surprisingly quiet.

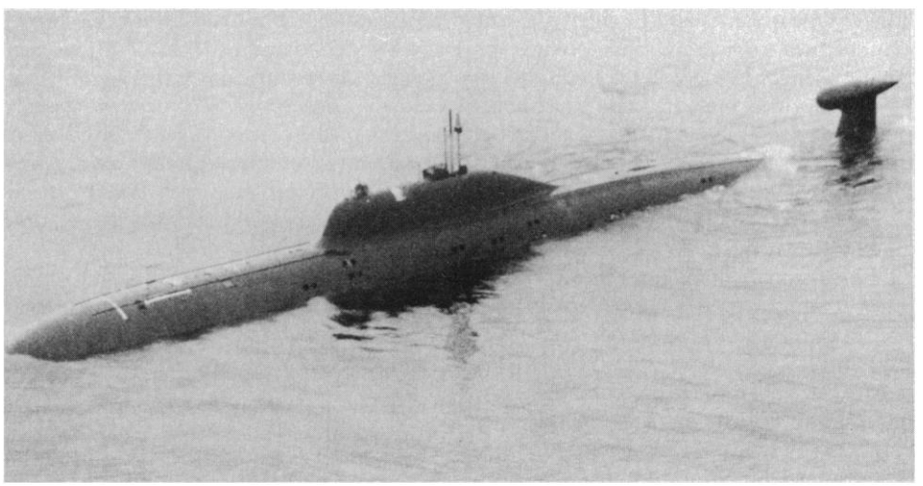
Western intelligence experts had not expected Soviet submarine designers to produce such a silent boat for at least another 10 years, says Norman Polmar, a defense analyst and expert on the Soviet Navy. The Akula, says Polmar, "shook everyone up."

For years, the Soviets had been putting massive resources into submarine design and construction, and they had achieved some impressive advances in speed and diving ability. But in the critical area of quietness, which is the key to survival in the shadowy world of undersea warfare, Soviet submarines had always been deficient. The stealthiness of the Akula indicated, however, that the U.S. Navy may in the future be facing submarines that would be far more difficult to detect, a prospect that has major implications for control of the seas in a superpower conflict.

Last week, a panel of experts assembled by the House Armed Services Committee issued a blunt assessment of the potential threat, and it urged that U.S. antisubmarine warfare (ASW) programs be stepped up to counter it. So far, the panel said, parochialism and infighting among different branches of the Navy have produced an inadequate response.

The panel points out that Western security rests heavily on the ability to ferry troops and military hardware from the United States to the scene of a conflict. "We are confident that we could still reinforce and support Europe or other vital areas adequately if war were to break out today," the panel says, "but whether we will be able to do that in the future is becoming much less certain." Moreover, quieter Soviet submarines "threaten the survivability of our carrier task forces," which have been at the center of the Reagan Administration's naval buildup and are the chief instrument for projecting U.S. military power around the globe.

A central conclusion of the panel, which has been looking into the issue for the past year, is that the Soviet advances in quieting their submarines may eventually render obsolete much of the ASW system that is now used by the United States and its allies to track and pinpoint enemy boats. "We believe that the Navy must, in effect, 'start over' with new approaches to ASW," the panel says.



The Akula: *The quiet submarine that could end the "free lunch" in ASW.*

The report also argues that the Navy should put more emphasis on designing innovative new attack submarines of its own in order to maintain its lead over the Soviets. In spite of the advances in Soviet submarines, U.S. boats are still superior, the panel says, but it complains that the Navy is focusing far too heavily on the SSN-21 Seawolf—a controversial and expensive new class of attack submarines, the first of which is scheduled to begin operations in the mid-1990s—to the detriment of long-term research on different designs.

Soviet submarines are now tracked by passive sonar, using sensitive underwater hydrophones that pick up the sounds emitted from submarine engines and propellers. Arrays of hydrophones are placed on the sea floor at the so-called choke points through which Soviet vessels pass when they enter the Atlantic and Pacific oceans from their home ports. U.S. submarines and surface ships also use passive sonar either onboard or on long arrays towed behind the ship to detect submarines in the open oceans.

Passive sonar has worked extremely well against relatively noisy Soviet submarines in the past, "but the free lunch is over," says William Perry, the panel's chairman and a former head of research and engineering in the Pentagon. Some improvements could be made in the sensitivity of passive sonar systems and more hydrophones could be deployed at the choke points. But, says Perry, there are rapidly diminishing returns from enhancements in existing passive sonar systems, and in any case, the "extra improvements that could be made wouldn't solve the problem" that ASW forces could face in the late 1990s.

The leading alternative to passive sonar is active sonar, which involves transmitting pulses of sound and listening for the telltale "ping" as the pulses echo off a submarine's hull. Active sonar has been used for decades, but it has a distinct disadvantage: it alerts the target submarine's crew to the fact that they are being hunted, and in submarine-to-submarine combat it gives away the location of the transmitting vessel. Moreover, active sonar is effective only at relatively short ranges compared with passive sonar—at least against noisy Soviet submarines. The panel's report notes only that "because it is not affected by Soviet quieting, active sonar is receiving newfound attention."

As for nonacoustic methods of locating submarines, the only one currently being used is magnetic anomaly detection, or

MAD, in which sensitive magnetometers, usually carried aboard ASW aircraft, are used to detect very slight distortions in Earth's magnetic field caused by the submarine's steel hull. The technique is effective only at very short ranges—usually a fraction of a mile.

Other techniques are only in the research phase. They include the use of blue-green lasers to probe the ocean depths, searching from space for surface waves or a slight hump in the ocean caused by the passage of a submerged submarine, and looking for minute changes in the water column caused by a submarine's presence. The panel notes that "it is far too early to judge the success of these efforts, particularly because much of this work is pressing the outer limits of science and technology." Says panel member Harold Rosenbaum, "I have seen nothing on the horizon that would render the oceans transparent."

The panel recommends not only that R&D on ASW be stepped up considerably, but that it be "considered as one of, if not the, highest priority activities in the [Department of Defense]." In the meantime, the report argues for a top-to-bottom shakeup in ASW operations, including the rapid introduction of new technologies when they are available and improved operational tactics using existing technologies.

Perry estimates that it will take 5 to 10 years for the Soviets to replace a significant number of their old, noisy submarines with quieter new models, and he says "we can do quite a lot in that time to improve acoustic techniques" and change operations.

The total Soviet fleet of attack submarines (as distinct from nuclear missile carriers) numbers about 300, most of which one congressional expert describes as "second-rate boats." But the Soviets have been great experimentalists in submarine design, introducing new models and technologies at a high rate.

About four Akula-class submarines are already in service, according to Polmar, and the Soviet Navy is also building relatively quiet versions of the Sierra class, a submarine that entered full service in 1986, and the Victor-III, a 1979-vintage boat. In addition, a titanium-hulled attack submarine dubbed the Alpha was fielded in 1978. Its high-strength hull gave it greatly increased depth capabilities, but it turned out to be noisy at high speeds and was extremely expensive. Only seven were built. Three years ago, an entirely new submarine appeared. Called the Mike, it appears to be one-of-a-kind, and it is now thought to be a test bed for trying out new technologies.

In contrast, the U.S. Navy tends to be more conservative, building improvements into a single basic design over many years. It also focuses strictly on nuclear boats—it even persuaded U.S. shipbuilders not to build diesel submarines for Israel and South Korea in the early 1980s. The Soviets, however, continue to build diesel-electric submarines called Kilos, which date from about 1980 and are used mostly for coastal defense. They are extremely quiet when running on batteries.

The panel also notes that some European countries—notably Italy, West Germany, and Sweden—have made major advances in nonnuclear submarine technologies that hold the prospect of very quiet boats at a fraction of the cost of a nuclear submarine. "Being the product of foreign technology, such submarines could well become available to Third World nations in the next decade," the panel says, which could put at risk ships operating near their coasts.

The most modern attack submarines in the 100-strong U.S. fleet belong to the SSN-688, or Los Angeles, class, the first of which entered service in 1976. The panel says that even the Akula is not as quiet as the SSN-688s, and the next generation of U.S. boats, the SSN-21, promises to be even quieter. They will, however, also be very expensive. The first one may cost as much $2 billion and additional copies are likely to run as high as $1.2 billion apiece.

Two years ago, a subcommittee of the House Armed Services Committee voted to block funding for the first SSN-21, arguing that the Navy should go back to the drawing board and come up with a more cost-effective boat. The full committee reversed this decision, however, and the program is now proceeding full steam.

The expert panel essentially took the SSN-21 program as a fait accompli, but it urged the Navy to pay more attention to future designs. The SSN-21 was "the best submarine we knew how to build 6 or 7 years ago," when the program began, says Perry, but there is also need for more revolutionary designs. ■ COLIN NORMAN

Mexican Research Center Closed

An internationally known research center dedicated to the study of Mexico's tropical ecology has been dismantled, a victim of the economic crisis that is squeezing indigenous research throughout Latin America.

The National Research Institute for Biotic Resources (INIREB), based in Xalapa in the state of Veracruz, supported an extensive botanical garden and compiled one of the largest herbaria in Mexico as well as unique collections of native fauna. The center also funded research in basic and applied ecology, and worked to transfer environmentally sensitive practices to Mexico's poor farmers. At its closing last year, the institute had an annual budget of about $3.5 million, employed 100 scientists and technicians, and maintained a network of regional research centers scattered throughout Mexico.

"To close such a place is really very sad and very frustrating," says Arturo Gómez-Pompa of the University of California at Riverside, who founded the institute in 1975 and served as its director until 1985. "At its peak, the center was one of the most active biological research institutes in Mexico."

In recent years, however, the institute floundered somewhat, burdened by union strife, a bloated bureaucracy, and the pressure to support large programs with less money, according to sources inside and outside of Mexico. INIREB was officially closed in November, on the last day of the outgoing administration of former President Oscar de la Madrid.

Gómez-Pompa says that the institute was unique because it attempted to combine the often contradictory objectives of conservation and rural development. One successful scheme involved growing an edible mushroom in the discarded husks of coffee beans. Another involved the production of electricity from the excreta collected at pig farms. The center also developed programs in wood science, pre-Hispanic agriculture, and the monitoring of environmental pollution.

The institute's famous garden and herbarium will be taken over by the National Institute of Ecology, which is moving its headquarters from Mexico City to Xalapa in April. But the fate of many INIREB scientists and their research projects remains unclear. The graduate students of INIREB are left wondering where they will complete their educations, since the Institute of Ecology cannot issue diplomas or academic degrees.

Reached in Mexico City, Gonzalo Halffter, director of the National Institute of Ecology, says he hopes to hire as many INIREB investigators as he can afford, but concedes that his $2.3-million budget will not be enough to absorb them all. Some young scientists from the defunct institute have already begun driving taxis in Xalapa. Such a waste of talent may be the biggest tragedy, says Silvio Olivieri, formerly at INIREB and now at Conservation International in Washington. "They could have improved INIREB. Instead, they destroyed it." ■ WILLIAM BOOTH