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Report to Congressional Committees

October 1991

NAVY RESEARCH

Status of Programs in Nonacoustic Antisubmarine Warfare Research

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National Security and
International Affairs Division

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October 31, 1991

The Honorable Sam Nunn
Chairman, Committee on Armed Services
United States Senate

The Honorable Daniel K. Inouye
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable Les Aspin
Chairman, Committee on Armed Services
House of Representatives

The Honorable John P. Murtha
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

As part of our continuing work on Navy issues, we conducted a review of nonacoustic antisubmarine warfare (ASW) research programs. Noting significant congressional interest in these programs in recent years, we compiled information on past and present developments to assist committees in this year's nonacoustic-ASW budget deliberations. Specifically, we gathered information from program participants and other informed sources on the key issues affecting whether the Navy should be given control over all nonacoustic-ASW research or whether the current independent nonacoustic research program led by the Office of the Secretary of Defense (OSD) should continue to exist.

This report summarizes and updates the information we provided in May and June 1991 to your staffs and includes the views of the Department of Defense and the Department of the Navy.

Background

Essentially, nonacoustic detections of submarines do not involve the use of sound in any way. Instead, as outlined in OSD's program plan for nonacoustic antisubmarine warfare research, electromagnetics, radar, optics, and environmental techniques are used.

The Navy has been conducting nonacoustic antisubmarine warfare research since World War II. Its early research was aimed at detecting

the thermal radiation signatures submarines emit. In the early part of the 1970s, a new concern arose that—the Soviets might be able to track our strategic submarines from space-based radars. During this decade, the Navy undertook a highly classified program to determine if that was possible. After many years of research, it concluded that it was not. A high-level group of nongovernment scientists reviewed this conclusion and concurred with it.

However, interest in the use of radar arose again in the 1980s. Various developments were occurring and U.S. officials believed that the Soviets were stepping up their radar research. That caused some U.S. scientists to doubt the Navy's earlier work and the Congress to establish research programs in addition to those administered by the Navy.

In 1989, a blue ribbon Advisory Panel On Submarine and Antisubmarine Warfare, known as the Aspin Panel, addressed the problem of submarine detection in the future and reported to the Congress that "dramatic new initiatives are essential if the problem [of detecting quieter submarines] is to be solved in time." The report further stated that "what is needed is an entirely new and aggressive architecture for coping with this immensely serious development." The report stated that "the Navy establishment—like many organizations of comparable size and strength—is burdened with internal vested and sometimes conflicting interests that encumber innovation" and that "the Defense Research Projects Agency (DARPA) should work in parallel with the Navy but pursue more advanced and riskier technological alternatives."

After considering this together with other testimony from the scientific community, the Congress decided to have OSD reorganize the entire nonacoustic-ASW program. In fiscal year 1990 all funding was withheld until OSD could write an entirely new nonacoustic-ASW program plan. The plan was submitted in April 1990, and obligational authority was released to OSD soon thereafter. The Navy continued to conduct its own nonacoustic-ASW program, but its funding now came from OSD.

The next fiscal year both OSD and the Navy received separate funding for their programs. However, the funds were held up that year until the Department of Defense certified to the Congress that the two programs were not duplicative. OSD and the Navy decided that the fiscal year 1992 program would be entirely under Navy control. The Defense budget for fiscal year 1992 contained no request for an OSD-led nonacoustic-ASW program. This development, which is being debated by the Congress, has concerned some scientists who have testified before Congress that

finding the new, quieter submarines requires innovative methods that most likely will be found outside of the Navy community.

Results in Brief

Although both the Navy and OSD oversee nonacoustic-ASW research programs, each has taken a different approach to solving the detection problem. The OSD program has focused on long-range basic research aimed at developing the scientific parameters needed for understanding nonacoustic technology applications; the Navy program has been aimed at near-term applied research in developing nonacoustic devices that can be more quickly deployed in the fleet.

Supporters of maintaining a nonacoustic-ASW research program in addition to Navy research point out that important nonacoustic initiatives, such as radar research, are extremely complex and need new, innovative, long-term research approaches if progress is to be achieved. Supporters of Navy-led nonacoustic-ASW research feel that the Navy understands the problem of tracking submarines better than anyone else and its approach—focusing on developing nonacoustic detection devices that can be used in conjunction with acoustic tracking techniques already in place or in development—is more realistic. Some Navy researchers also worry that if two parallel research programs are maintained, both may eventually end up underfunded as future budget cuts occur.

Most experts agree that, regardless of who the manager is, there needs to be a settling down period where the program can achieve a measure of stability and move forward.

OSD and Navy Research Programs Have Different Approaches

During fiscal years 1990-91, both OSD and the Navy managed nonacoustic-ASW research programs. While the programs shared a similar goal—to develop nonacoustic means for detecting submarines—their approaches were different. The OSD program is more long term in nature and attempts to ascertain how certain basic scientific principles can be better used in the development of prototype nonacoustic detection systems. The Navy program, on the other hand, is attempting to develop practical means of nonacoustic detections that can be more quickly translated into deployable hardware. The Department of Defense certified to the Congress in fiscal year 1991 that the two programs were complementary, not duplicative.

Some Experts Believe More Basic Research Is Needed

A number of the experts we interviewed said that nonacoustic-ASW research in general, and radar research in particular, is a far too difficult and important research priority to remain strictly within the Navy's research and development community as the Department of Defense's fiscal year 1992 budget proposes. They advocate a program that is totally open to a free exchange of ideas and information, similar to what has been structured under OSD management, that enables the best experts to be actively involved in all phases of research. According to these experts, the concept of a separate nonacoustic-ASW research program has the advantage of providing an objective work setting devoid of the many pressures and biases typically present in large organizations such as the Navy.

Some experts told us that research into a high-risk, high-payoff project, such as radar, is a long-term effort that, given its emphasis on shorter-term development of deployable nonacoustic devices, the Navy establishment may find difficult to undertake. At the same time, many experts feel that the Navy will do a good job of developing near-term nonacoustic-ASW projects and should continue to be involved, especially with nonacoustic techniques such as optics and magnetics.

Proponents for conducting separate research told us that fostering a certain degree of healthy competition between Navy and non-Navy research program participants would encourage individuals and organizations to perform at their highest levels, especially in nonacoustic technology where the scientific issues are extremely complex. Proponents also said that OSD's research program is broader based than the Navy's because it includes entities that usually do not play key roles in traditional Navy-led research projects—participants from national laboratories and foreign governments. The proponents indicated that these types of outside organizations provide good sources of expertise and differing viewpoints.

Experts we interviewed expressed mixed opinions about the results of OSD's radar program. Some outside of the OSD program have said that OSD's research is not making much progress or is not appropriately serving the Navy's best interests; in contrast, most of the experts involved in OSD's radar program said that their projects were showing promising results. The Deputy Assistant Secretary of the Navy for ASW said that OSD's radar project has turned up some interesting results that point to the need for more research of the type OSD is conducting.

Navy Officials Believe in Nonacoustic-ASW Projects Geared More Towards Applied Research

The Navy nonacoustic-ASW program has been trying to develop practical applications of nonacoustic techniques that can eventually result in deployable systems. The Navy's approach has been more geared to system development than OSD's. The Navy feels that its approach is more realistic and will result in effective, relatively low-cost devices that can be used in conjunction with acoustic systems to improve overall detection capabilities.

Some Navy program participants feel, for example, that the Navy's radar research project will result in devices that can be developed without significant investments of time and money to develop. They told us that, while OSD's radar project has been broader, OSD has been covering issues that had already been fairly well researched in the past by the Navy.

Additionally, a number of participants in the Navy program expressed the concern that with two research efforts, it is possible that future funding may not be adequate to support them both, causing both to be underfunded and thereby less effective. The Navy believes that it is in the best position to direct nonacoustic-ASW research efforts and that in this time of tight budgets an independent program is not cost effective. A high-level Navy official stated, however, that if Congress wants an independent program, it should be placed under the Defense Advanced Research Projects Agency (DARPA), not OSD, because DARPA has the program management expertise to tackle a problem of this magnitude and has worked successfully with the Navy on research for many years. However, a number of non-Navy experts felt that if Congress wants an independent nonacoustic-ASW research program, it should remain within OSD since a change in program managers at this time would cause further delays and waste more money.

Experts Generally Agree Settling Down Period Is Needed

Most experts we interviewed said that in the last 2 years disruptions have impeded the progress of the program. They generally agreed that regardless of which organization manages the program, there must be a period of at least 5 years where funding will be adequate and stable. In their view, this would allow both the program managers and contractors to plan for the longer term, a necessity in research of this nature if substantial progress is to be expected.

Agency Comments

The Department of Defense generally concurred with a draft of this report. The Department commented that although the Navy's program is

oriented toward delivery of affordable ASW systems to the fleet, the program has included a long-term effort on technical feasibility and significant basic research and exploratory development. The Department's comments are presented in their entirety in appendix II.

Scope and Methodology

We interviewed officials covering a wide range of activity within the nonacoustic arena, concentrating mainly on personnel working in either the Navy's nonacoustic-ASW program or the OSD-led nonacoustic program. We also reviewed documentation provided by OSD, the Navy, contractors, and government laboratories. Offices and installations visited included the Office of the Undersecretary of Defense for Acquisitions; the Office of the Assistant Secretary of the Navy for Research, Development, and Acquisitions; the Space and Naval Warfare Command; the Lawrence Livermore National Laboratory; the Jet Propulsion Laboratory; the Naval Ocean Systems Center; and six contractors working in the OSD and Navy nonacoustic programs. We also interviewed an official with the United Kingdom's Royal Aerospace Establishment, which participates jointly with OSD in its radar research project.

Due to the complexity of the scientific issues involved, we did not assess the merits of any particular research program. The results of any program or project could vary significantly due to scientific interpretations of expert participants. We obtained comments from experts working in nonacoustic research for the Navy, OSD, or both to determine the issues central to whether a separate nonacoustic-ASW research program should be maintained in fiscal year 1992.

Our review was performed between October 1990 and August 1991 in accordance with generally accepted government auditing standards.

Appendix I contains brief descriptions of the current nonacoustic-ASW programs.

We are sending copies of this report to the Secretaries of Defense and the Navy, the Director of the Office of Management and Budget, and other interested congressional committees. We will also make copies available to others upon request.

Please contact me at (202) 275-6504 if you or your staff have any questions concerning this report. Other major contributors to this report are listed in appendix II.

Martin M Ferber
Director, Navy Issues

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Abbreviations

ASW	Antisubmarine Warfare
DARPA	Defense Research Projects Agency
OSD	Office of the Secretary of Defense
SPAWAR	Space and Naval Warfare Systems Command

Brief Descriptions of Current Nonacoustic Antisubmarine Warfare Programs

The majority of nonacoustic antisubmarine warfare (ASW) research is carried out in two programs—one conducted by the Office of the Secretary of Defense (OSD) and another within the Department of the Navy. There are, however, some nonacoustic projects ongoing within the Office of Naval Research and the Office of the Chief of Naval Operations, but these do not directly fall in the category of antisubmarine warfare research and were not included in this review.

Because of the classified nature of specific projects in each program, only a very brief description of the programs can be included in this report.

OSD's Nonacoustic-ASW Research Program

OSD's nonacoustic-ASW program, which is managed within the Office of the Undersecretary of Defense for Acquisitions, was begun in fiscal year 1990 as a result of being tasked by the Congress to put together a comprehensive program plan. During fiscal year 1990, OSD had total control of all nonacoustic-ASW funds and granted funds to the Navy so that it could continue as program manager over projects begun before OSD took over the entire program. According to an OSD spokesperson, the Navy participated in formulating the nonacoustic-ASW comprehensive plan.

The program that most interested OSD was long-term research into radar. Concerned that the Congress wanted a long-range program in this area and the Navy did not, OSD continued with and improved upon a program that was already underway within the Defense Advanced Research Projects Agency (DARPA) and included participation by the United Kingdom's Royal Aerospace Establishment. OSD brought in the Department of Energy's Lawrence Livermore National Laboratory as the prime contractor to oversee the U.S. interests in this program. Lawrence Livermore has performed some of the work in house and contracted out work as necessary. OSD also sponsored other nonacoustic-ASW activities, including an optics project and a radar program managed by the government of Norway.

OSD was appropriated $20 million for its fiscal year 1990 nonacoustic-ASW program. Of this amount, $12 million was expended on the Navy's nonacoustic-ASW program. In fiscal year 1991, the Congress appropriated funds to both OSD and the Navy for nonacoustic-ASW research. OSD received $30 million but, according to an OSD official, was mandated to apply $11.5 million to the Navy's nonacoustic-ASW program, which already had been appropriated $14 million. That left OSD with $18.5 million for its 1991 nonacoustic-ASW program.

The Navy's Nonacoustic-ASW Research Program

The bulk of the nonacoustic-ASW program in the Navy has been conducted within the Space and Naval Warfare Systems Command's (SPAWAR) PMW-185 Nonacoustic-ASW Program Office. PMW-185 has been overseeing projects in all four nonacoustic-ASW functional research areas. SPAWAR has conducted its program by contracting primarily with firms experienced in nonacoustic technologies.

In fiscal year 1990, PMW-185 received $12 million from OSD for its programs; however, obligational authority over those funds was delayed nearly 8 months while, as directed by the Congress, OSD rewrote the nonacoustic-ASW program plan. According to a Navy program spokesman, this delay caused some projects to fall considerably behind schedule.

In fiscal year 1991, PMW-185 received a budget of approximately $25.5 million to conduct its programs, including $11.5 million from OSD. Obligational authority over these funds was delayed until January 1991 when the Congress received the required certification from DOD that the Navy and OSD nonacoustic-ASW programs were complementary, not duplicative.

The Chief of Naval Operations has been conducting a small nonacoustic research program not directly related to antisubmarine warfare. The Office of Naval Research has been conducting some basic technical research in the nonacoustic area as well.

Comments From the Department of Defense

DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING

WASHINGTON, DC 20301-3010

30 SEP 1991

Mr. Frank C. Conahan
Assistant Comptroller General
National Security and
International Affairs Division
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report entitled -- "NAVY RESEARCH: Status of Programs in Nonacoustic Antisubmarine Warfare Research," dated August 20, 1991 (GAO Code 394394 OSD Case 8808). The Department generally concurs with the draft report.

The Department would like to clarify several points, however. The DoD agrees that the Navy advanced development and engineering development programs are oriented toward delivery of affordable Antisubmarine Warfare systems to the fleet. It should be emphasized, however, that to meet the described objective, the Navy Nonacoustic Antisubmarine Warfare program has included a long term emphasis on technical feasibility, based on a firm understanding of relevant scientific principles -- independent of ultimate system affordability. In addition to system development efforts, the Navy Nonacoustic Antisubmarine Warfare program includes significant basic research and exploratory development.

The Navy plans on executing a Nonacoustic Antisubmarine Warfare program, including radar research, that will continue to emphasize development and test in real ocean environments, and that will be consistent with the intent of Congress. New Nonacoustic Antisubmarine Warfare devices to aid the fleet can not be developed without significant investment of time and money.

The DoD appreciates the opportunity to comment on the draft report.

Sincerely,

Charles E. Adolph
By Direction of the Secretary of Defense

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