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Status of the Navy's New Seawolf Attack  
Submarine and its New Combat Systems

Statement of  
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Before the  
Subcommittee on Seapower and Strategic and  
Critical Materials  
Committee on Armed Services  
U.S. House of Representatives



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Mr. Chairman and members of the Subcommittee:

I am pleased to appear before the Subcommittee today to discuss the status of the Navy's new Seawolf nuclear attack submarine (SSN-21) program and its AN-BSY-2 combat system.

As you know, the SSN-21 program is a part of DOD's major warship review. We have been told that the results of that review have been presented to the Secretary of Defense but have not yet been made public. In the meantime, an Office of the Secretary of Defense program review of the SSN-21 and BSY-2 programs, scheduled for the end of this month, has also been delayed.

The SSN-21 and its combat system are multibillion dollar programs. To field the weapon as fast as it can in order to counter a perceived Soviet quiet submarine threat, the Navy has planned the use of concurrency not only between the SSN-21 and BSY-2 programs but within the SSN-21 and BSY-2 programs themselves--a practice that has proven costly in previous DOD programs.

We recognize that shipbuilding presents a unique challenge because of the time it takes to design and build a complex ship like the SSN-21. Last year, the Congress enacted a provision that recognized that a number of ships could be on contract prior to completion of operational test and evaluation on the lead ship. However, if the Navy is permitted to carryout its ship construction plans, it will have as many as 15 of the total planned buy of 29

SSN-21s (over 50 percent) under contract before the lead ship is tested. Also, the planned SSN-21 program will consume a large part of the Navy's shipbuilding budget.

## **BACKGROUND**

The SSN-21 will be larger, quieter, tactically faster and deeper diving than Los Angeles class nuclear attack submarines (SSN-688)--the last 18 of which are currently under construction. The SSN-21 will also carry more weapons than earlier classes of attack submarines.

Critical to the SSN-21 achieving its mission requirements is the successful development of the BSY-2 combat system, an advanced computer system designed to enable the submarine to detect and locate targets faster than existing submarine combat systems can, allow operators to perform multiple tasks and address multiple targets concurrently, and reduce the time between detecting a target and launching weapons. This is to be accomplished through computer-aided detection, classification and tracking, the use of a wide aperture array hull-mounted sensor, and enhanced information management.

The SSN-21 and BSY-2 are being developed as separate programs, each under the direction of its own program manager and subject to its

own management system. The BSY-2 is to be provided as government furnished equipment to the submarines' shipbuilders.

The Navy is using two shipyards to design the SSN-21--the Newport News Shipbuilding Company and the Electric Boat Division of General Dynamics Corporation. Newport News is responsible for the submarine's overall design under a \$343 million cost-plus-fixed-fee contract. Electric Boat is designing the engine room and its equipment under a \$212 million cost-plus-fixed-fee contract. Some research and development and detailed design efforts will continue concurrently with construction of the first SSN-21.

Electric Boat began construction of the first SSN-21 in October 1989. Delivery is scheduled for May 1995, with an estimated cost of \$1.9 billion. The Navy expects the unit cost of the next three SSN-21s will decline and that the fifth and subsequent SSN-21s will not exceed \$1 billion each in 1985 base year dollars, which would equate to \$1.3 billion in today's dollars. For fiscal year 1991, the Navy is requesting \$3.5 billion for the second and third ships, two combat systems, and long lead time items for the fiscal year 1993 program.

The BSY-2 is critical to the submarine achieving its full mission and performance capabilities. The Navy has no alternate planned should the BSY-2 development be delayed. In March 1988, the Navy awarded General Electric a fixed-price incentive fee contract worth

up to \$1.84 billion to develop the BSY-2 combat system and produce the first unit for the lead submarine, with options for two more systems and related items. Full-scale engineering development is scheduled to proceed into fiscal year 1996. Total development and procurement costs for 29 planned BSY-2 combat systems are estimated to be \$7.4 billion in then-year dollars.

**PRIOR GAO WORK ON**

**SSN-21 AND BSY-2**

Over the past 3 years we have issued nine products on the SSN-21 and BSY-2 programs. In summary, these were

- a March 24, 1987, testimony on the SSN-21 and BSY-2 programs during which we expressed concerns about affordability and concurrency;
- an April 28, 1987, letter to Senator Warner comparing similarities between the SSN-21's combat system and the B-1B's avionics system programs, in which we concluded that when production drives the development schedules of critical state-of-the-art subsystems, technical problems identified during development testing typically impact program cost, schedule, and performance;

- a March 13, 1989, report on technical challenges in development of the BSY-2, in which we concluded that there were several areas of risk where increased Navy management attention should be focused to meet the BSY-2 performance requirements within the tight timeframes and cost;
  
- a November 27, 1989, classified report on the SSN-21 construction program in which we discussed the program's status and its affordability and which was released in an unclassified version on April 19, 1990;
  
- a December 28, 1989, report on the SSN-21 propulsor and other aspects of the SSN-21 in which we presented a status of propulsor testing;
  
- a January 31, 1990, report on the Navy's submarine combat systems, including the BSY-2 which discussed cost increases, schedule slippage and a phased delivery of the first system's software;
  
- a February 14, 1990, report on advanced submarine technology in which we concluded a better process needs to be established to ensure the transfer of such technology into current submarine construction programs; and

-- an April 26, 1990, and May 22, 1990, testimonies on the SSN-21 and BSY-2 programs during which we expressed concerns about affordability and concurrency.

#### AREAS OF CONCERN

Today our concerns remain the same as reported in our earlier products. Although Soviet submarine capability is increasing, I believe that in recognition of the realities of Defense budget projections as well as today's changing world environment, concerns over affordability and concurrency need to be given more careful attention and thorough debate. A part of that debate should be alternative shipbuilding plans--including program delays or cancellations and, as the Senate Armed Services Committee recently recommended, building additional improved Los Angeles class submarines instead of SSN-21s. These types of considerations will have an impact on the Navy's shipbuilding industrial base; however, in today's environment it may be unavoidable. Just what the extent of that impact might be we cannot say because we have not performed that body of work.

I would now like to highlight the major issues we believe must be addressed at this point in the SSN-21 and BSY-2 developments.

## Concurrency

To meet its planned delivery date of May 1995, the SSN-21 program is using a concurrent scheduling approach which has construction ongoing while design is continuing. Current plans call for as many as 15 ships to be on contract or under construction before the first ship is available for operational testing.

The SSN-21's construction schedule is driving the development and production schedule of its combat system. In 1988 the Navy stipulated that the delivery of the first BSY-2 was required by November 1993 to meet the scheduled delivery of the first SSN-21. However, when the Navy awarded the full-scale development contract for the combat system, it agreed to have all system hardware and about 86 percent of its software delivered to the Navy by that date. The remaining 14 percent of software is to be delivered in November 1994.

DOD has reported that the combat system program is a low performance and schedule risk but a moderate cost risk. However, as currently scheduled, we believe this program could be a high risk because of the large quantity of software that will be required for system development. Development of the BSY-2 is one of the most technically challenging and complex software development efforts ever undertaken for a submarine. The BSY-2



combat system will require up to 800 software personnel to develop and integrate about 3.2 million lines of code--over 2 million of which is planned to be written in the new Ada programming language.

The SSN-21 is to be built using modular construction techniques. For this technique to be successful, the detailed drawings for a particular ship section must be accurate even down to pipe and cabling runs before construction of that section begins. The SSN-21's detailed design drawings are being validated through incremental testing of subcomponents, program reviews, and construction of full-scale model mockups. As the ship design is finalized, any subsequent changes in subsystems and subsystem configuration designs can be costly. Problems have been experienced in this area. Previously, because of two BSY-2 design changes, portions of the SSN-21 had to be redesigned. In addition, as a result of normal system design definition, the estimated weight of a number of BSY-2 cabinets increased. The total estimated increased weight amounts to about 4-1/2 tons. Newport News has not yet determined what effect this will have on ship design costs.

### **Affordability**

The Navy wants to buy 29 SSN-21s by the year 2000 at an estimated cost of about \$44 billion in then-year dollars.

Fiscally constrained budgets and the cost of each SSN-21 may not allow the Navy to buy all 29 SSN-21s. The Navy's SSN construction plan is based upon several assumptions which, in our opinion, may not be achievable. For example, to execute the SSN construction plan within a shipbuilding budget that would grow at an annual real rate of 3 percent, the Navy would have to

- increase the percentage of shipbuilding funds allocated to SSN construction from 19 to 26 percent,
- reduce average planned SSN construction time from 65 months to about 52 months,
- receive authorization and funding for an average of about 3 ships per year, and
- incur no cost overruns requiring supplemental funding.

Further, during a period of zero or 3 percent negative real growth budgets, the Navy's planned SSN program could consume up to 36 percent of its shipbuilding budget.

## CONCLUSIONS

Constrained defense budgets, coupled with the changing geopolitical environment and the apparent lessening of the Soviet threat associated with it, indicate that the Navy should reexamine the SSN-21 and BSY-2 programs. First, the Navy should examine the degree of concurrency within and between these programs and consider a slower pace so as to reduce the risks that high concurrency programs present. Second, because of SSN-21 affordability issues, there are likely to be important trade-off decisions that will have force level and industrial base implications. To manage and minimize the impact of those trade-off decisions, the Navy should examine alternative shipbuilding plans. It is our hope that the Secretary of Defense's mandated major warship review and the upcoming program review will provide the high level attention a program of this importance deserves.

This concludes my prepared remarks and I would be pleased to respond to any questions.