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STATUS OF THE NAVY'S NEW SEAWOLF ATTACK SUBMARINE AND ITS NEW COMBAT SYSTEM

STATEMENT OF
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BEFORE THE SUBCOMMITTEES ON PROJECTION FORCES AND
REGIONAL DEFENSE, AND CONVENTIONAL FORCES AND
ALLIANCE DEFENSE
COMMITTEE ON ARMED SERVICES
U.S. SENATE

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 attack submarine (SSN-21) construction program, and

-- development of the Seawolf's new combat system[1].

We have been monitoring these programs as well as their predecessor programs -- the improved Los Angeles (SSN-688) class submarine and its combat system.

SSN-21 ATTACK SUBMARINE (SEAWOLF) -- BACKGROUND

The Navy's new Seawolf attack submarine is being designed to counter Soviet submarine capability advances. The submarine's expanded missions will include antisubmarine and antisurface ship warfare as well as strike warfare, surveillance, and mine warfare. The Navy states that the currently deployed Los Angeles class submarines cannot adequately meet the expanded mission for attack submarines. The Seawolf program was solely in the Research, Development, Test, and Engineering (RDT&E) stage until fiscal year 1987 when Congress first appropriated advance procurement funds.

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[1]A submarine combat system detects, classifies, tracks, and destroys enemy targets. The major subsystems of a combat system are: acoustics (sensors) and combat control (fire control and weapons launch).

Costs

The costs associated with the multipurpose Seawolf submarine are significant. By the year 2000, the Navy plans to request authority to build at least 28 of these submarines for a total estimated procurement cost of $29 billion (fiscal year 1985 dollars). Life cycle costs are estimated to total approximately $32.7 billion (fiscal year 1985 dollars) through 1999. These costs include estimates for military construction, personnel, operations and maintenance, but exclude RDT&E costs for the combat system, related electronics costs, and weapons.

The Navy imposed a construction cost cap of $1.6 billion on the first submarine and a cost cap of $1.0 billion on the fifth ship (in fiscal year 1985 dollars). Although a cost cap was not placed on the second, third, and fourth ships, costs are expected to steadily decline to $1 billion per ship by the fifth ship. This is nearly double the current cost of a Los Angeles submarine. According to the most recent budget estimates, Navy will need SCN funds of $1.8 billion including outfitting and post delivery costs (or $1.5 billion in fiscal year 1985 dollars) to build the lead ship.

The Navy, at congressional direction, also plans to establish two cost caps on total RDT&E costs--one for the Seawolf hull, mechanics, and electronic, and another on the combat system program. The cap excludes nuclear components and contract design.

Although the amount of the cap is still being considered by the Navy, RDT&E base year cost estimates for the two programs are $2.6 billion for the platform and $1.6 billion (in fiscal year 1986 dollars) for the combat system.

Schedule

The Newport News Shipyard began detailed design in January 1987 and it is expected to last 4 years. The Navy plans to complete and validate approximately 80 percent of the detailed design drawings before awarding the lead ship construction contract in November 1988. Validation is to be accomplished through program reviews, incremental testing of subcomponents and scale model mockups. The first ship is scheduled to be delivered to the Navy in November 1994.

The Navy plans to request authority to buy the second and third ships in fiscal year 1991, the fourth and fifth ships in fiscal year 1992, and the sixth, seventh, and eighth ships in 1993. The construction contract award for the second ship is planned for November 1990. Through 1999, if the Navy's plan is executed, 28 Seawolf submarines will have been authorized with 12 delivered.

Performance

The Navy maintains that the attack submarine force has a key role in successfully accomplishing the Maritime Strategy. The Navy also maintains it needs a minimum of 100 attack submarines to effectively accomplish this mission, and must build an average of

3 1/3 nuclear attack submarines per year to counter the increasing Soviet threat. The Navy designed the Seawolf to be quieter, tactically faster, deeper diving, and able to carry more weapons than the current Los Angeles class, which the Navy says no longer has any growth potential. To support the Maritime Strategy, the Seawolf will have an expanded mission which includes deploying into forward ocean areas to seek out and destroy Soviet strategic missile submarines and surface ships, to lay mines, and to attack land targets.

Program officials have told us that current RDT&E efforts indicate that the Seawolf non-nuclear components will probably achieve planned silencing capabilities as defined in the Top-Level Requirements (TLR). However, while most of the SSN-21 nuclear technology has been tried and tested, officials indicate it may be too soon to verify whether nuclear components will achieve planned silencing thresholds because noise generation is difficult to measure. Currently, both nuclear and non-nuclear subcomponents are primarily tested individually. Multi-component tests are not planned until the early to mid 1990s.

FISCAL YEAR 1989 COMBAT SYSTEM (FY89CS)--BACKGROUND

To counter the Soviet Anti-Submarine Warfare threat, the Navy is developing a new combat system for the Seawolf submarine. The combat system is expected to improve response times, operability

and firepower through system improvements such as computer-aided detection, classification, and tracking. This will be accomplished by using a wide aperture array (WAA)[2] and enhanced information management. The Navy is planning to provide Seawolf and Los Angeles class submarines (authorized in fiscal year 1989 and beyond) with WAA capability. Although the combat system design is not yet finalized, the system is expected to consist of hardware and software from the Los Angeles submarine's combat system and new components and software. Currently, the Seawolf's combat system is in design definition phase of development.

Cost

The Navy estimates total acquisition costs for the combat system to be about $7.3 billion -- $1.6 billion for RDT&E and $5.7 billion for procurement. This estimate includes the costs of 28 combat systems, all spares, trainers and shore sites. (It also includes eight WAAs to be installed on Los Angeles class submarines authorized in fiscal year 1989 and beyond.) The International Business Machine Corporation (IBM) and the Radio Corporation of America (RCA) are competing for the Seawolf combat system's full-

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[2]A wide aperture array is a passive sensor that will be mounted on the hull of SSN-21 submarines and SSN-688 submarines authorized in fiscal year 1989 and beyond. It is expected to provide enhanced capabilities over previous combat systems by determining the locations of targets faster, and by providing more accurate target range and target motion analysis.

scale development contract. Both contractors are developing system designs and cost proposals. They are not scheduled to be submitted to the Navy until July 1987. As a result, the adequacy of funding estimates will not be known until the contractors' system design and cost proposals are evaluated, probably by September 1987.

The Navy's research, development, test, and evaluation costs estimate of $1.6 billion (fiscal year 1986 dollars), includes $255 million for development of combat system software. Since the software estimate was prepared, a program official estimates that the combat system will require about 4.2 million lines of software of which about 2.5 million lines will have to be newly developed. In discussions with Naval Underwater System Center officials, we were informed that it could cost about $300 per line to develop, fully document, and test a new line of software, which could mean that the cost of this new software alone could be about $750 million. The remaining 1.7 million lines of software will either be retained and/or modified from previous combat systems. A more precise amount of the new or modified software that will be required to implement the program will not be known until the contractors submit system proposals in July 1987.

Schedule

RCA and IBM were awarded contracts for the system design definition phase in January and March 1986, respectively. A request for system proposals was issued on February 18, 1987, to the two

contractors for development hardware, a weapons launch trainer, and a basic operator trainer. Options are also included for 3 combat systems, a land based engineering system, a maintenance trainer, and 6 WAAs for SSN-688 class submarines authorized during fiscal year 1989 through 1991. Proposals are due back to the Navy on July 6, 1987. The Navy, in January 1988, plans to award to either IBM or RCA a fixed price contract for the full-scale development of the FY89CS, with options for limited production to support the fiscal years 1989 through 1991 requirements.

The successful contractor (leader) will perform most of the full-scale development and limited production effort, including system hardware and software for acoustics, combat control, displays, and WAAs. The contractor not selected (follower) will perform at least 15 percent of the full-scale development/limited production contract, including some portion of the tactical combat systems and one WAA system. The leader contract will include incentives and an award fee pool. The incentives are a 50-50 percent saving share line between the government and the contractor for development and production. Funds awarded in the fee pool are to be based on how the leader is: (1) educating the follower, (2) meeting design to cost goals, and (3) managing the program, particularly its subcontractors. The first combat system is scheduled to begin system testing and integration in about October 1991 and be delivered to a shipyard in November 1993. The first SSN-21 is scheduled for delivery 1 year later, in November 1994.

The Navy plans to issue a subsequent follow-on limited production fixed price contract from fiscal year 1992 through fiscal year 1995. This contract is required because planned procurements will be concurrent with development of the combat system. The first full production acquisition of the FY89CS is expected in fiscal year 1996.

Performance

Program officials are concerned that contractors' proposals will not contain all performance capabilities required in the combat system's specifications, called the Prime Item Development Specifications (PIDS). The Deputy Program Manager is confident that both contractors will submit proposals that provide all war fighting capabilities within cost and on schedule. However, the extent of total system capabilities will not be known until the contractors submit their proposals in July 1987.

AREAS OF CONCERN

Both of these major programs are important to the Navy and like other weapon system programs of similar magnitude there are issues associated with them. We have, identified the following four areas of concern that we (1) plan to continue to monitor on both the Seawolf and combat system programs, and (2) believe will require Navy management attention.

-- Seawolf's affordability,

-- Seawolf construction techniques,

-- simultaneous development efforts, and

-- concurrency within the combat system program.

Affordability

In an austere budget climate, the cost of the Seawolf has affordability implications. Recently, the Navy was of the view that the cost of these submarines would not rise "much more" than historical attack submarine acquisition costs of about 20 percent of the Navy's ship construction budget. The Navy now feels it can limit Seawolf production costs to about 26 percent of the ship construction budget, assuming annual real growth in that budget of 2 percent. If the Navy builds an average of 3 1/3 Seawolfs a year within the cost cap as planned, the cost of these submarines, with an average annual appropriation of about $11 billion (fiscal year 1987 dollars), could represent as much as 32 percent of the Navy's ship construction budget. If costs increase above the estimates or if real budget growth falls below 2 percent, then their percentage could be even higher.

The costs associated with the Seawolf raise concerns about the budgetary impact it will have on both the attack submarine force and the 600-ship Navy. Although the Secretary of the Navy capped acquisition costs of the Seawolf at $1 billion (1985 dollars) for the fifth through 28th ship, this figure represents a significant increase over Los Angeles submarine costs. If the Navy is unable to stay within the cost cap and/or there is no real growth in the

budget, the Navy's ability to reach and maintain the 600-ship Navy and/or the 100 nuclear attack submarines portion of that force would be strained and the Navy would be faced with force structure "trade-off" decisions.

Modular Construction Techniques

The Seawolf will be built using modular construction techniques in lieu of traditional "hull-up" construction techniques. One of the major differences between these techniques is the degree of completeness that the detailed design must have before fabrication begins. Under the modularization technique, most of the detailed design must be completed and validated before fabrication begins, including configuration data on system and subsystem designs. These detailed drawings must be accurate even down to pipe and cabling runs. Once the drawings are complete, they should be validated to make sure the boxes fit, electrical connections and pipe runs meet where they are supposed to so as to avoid ship or system modification. If they don't, then problems, similar to those being experienced in the improved Los Angeles submarine construction program, could surface during fabrication.

The Navy has allowed 4 years for the detailed design phase. Initially, detail design was scheduled to begin in October 1986, but did not start until January 1987. Under current plans, the Navy intends to have approximately 80 percent of the detailed design complete before fabrication begins. These drawings will be

validated through incremental testing of subcomponents, program review, and construction of scale model mockups. It is important that the Navy adhere to its planned course of action. On the improved Los Angeles submarine program, because of cost, the construction of the mockup was halted, the drawings were not validated and construction problems ensued.

Simultaneous Development Efforts

The Seawolf's construction schedule is driving the development and production schedule of its combat system. According to DOD and Navy officials, the combat system is critical to the Seawolf achieving it full combat capabilities and mission requirements. Its predecessor, the Los Angeles submarine combat system, cannot be used on the Seawolf without major hardware and software upgrades because of differences in ship sensor capabilities, data processing requirements, and weapons and weapons launch integration. Because the SSN-21 will be constructed using modular construction techniques, a larger percentage of the detailed drawings must be completed sooner and earlier delivery of certain equipment, such as bow arrays, and information will be required than would be the case under traditional construction techniques. The dates this equipment and information is needed by the shipbuilder, and when it can be made available by the Navy, is currently under negotiation between the Navy and the ship designers.

The Seawolf combat system is in the early stages of development. Top level requirements and specifications have been drafted defining what the system must do to counter the threat. However, the system design will not be definitized until contractor proposals have been received in July 1987, the Navy reviews and evaluates those proposals, and awards a full-scale development contract.

The Navy believes that implementing the combat system program is a medium schedule risk. However, as currently scheduled, this program could be a high risk because of the large quantity of software that will be required for system development.

Under the Los Angeles' combat system program, the time required for software development and integration was underestimated. The combat system was originally scheduled to have total system software when delivered to the shipbuilder in May 1987, approximately 4 years after full-scale development began. Due to the complexity of the combat system, and cost schedule and performance problems during its development, total software will not be delivered until at least September 1988, more than 1 year later than planned. Under the Seawolf's combat system program, the Navy has an additional year, or 6 years to develop, test, integrate, and deliver nearly twice the amount of software. In recognition that implementing the Seawolf's combat system is an ambitious schedule and will require a large quantity of software,

planning to provide the contractors with software development equipment and processors so that they can begin developing software earlier than with previous combat systems, and is requiring the contractor's to submit risk mitigation plans.

Concurrency

To meet the Seawolf's construction schedule, the first combat system must be delivered to the shipyard in November 1993. Navy program documentation shows that this combat system program, like the previous combat system program, will require concurrent development and limited production in order to meet required system delivery schedules. For example, the Program Guidance and Assumptions, dated May 9, 1986, shows the full-scale development phase extending into fiscal year 1996, with system deliveries beginning in November 1993. Under this schedule, by the time the first Seawolf completes its operational test and evaluation in November 1995 the Navy will have delivered

-- two engineering development models,

-- all trainers, and

-- two production models.

The Navy recognizes that there is a risk associated with the limited flexibility of this approach, but contends there is no alternative because the combat system's development and its delivery schedule are being driven by the ship construction schedule. As a result, there is a high risk that the first Seawolf may not achieve full tactical performance capabilities when first

delivered to the Navy. In fact, an April 2, 1986, Navy memorandum stated that some operability improvements may be delivered without sea validation and some will be delayed requiring further development and modification.

The advantage to concurrently developing and producing a combat system is that the system can be developed and delivered earlier. The disadvantage is that if technical problems have not been resolved, then all subsequent systems will have similar problems until they are fixed.

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Mr. Chairman this concludes my prepared remarks and I would be pleased to respond to any questions you might have.