RESEARCH, DEVELOPMENT, TEST AND EVALUATION BUDGET ESTIMATES FOR THE SSN-21 SUBMARINE PROGRAM

Report Number 92-122

June 30, 1992

This special version of the report has been revised to omit proprietary data.

Department of Defense

DISTRIBUTION STATEMENT A
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20000525 074
June 30, 1992

MEMORANDUM FOR ASSISTANT SECRETARY OF THE NAVY (FINANCIAL MANAGEMENT)


We are providing this final report for your information and use. We prepared this report to inform you of a condition that we noted during our "Audit of the Cost Estimates for the SSN-21 Class Attack Submarine Program." The condition was $182.2 million of unsupported SSN-21 requirements in the Research, Development, Test, and Evaluation (RDT&E) program that was planned at the time of the audit. Subsequently, the January 1992 President's Budget contained no RDT&E funding for SSN-21 development, although the Program Office believes that requirements remain and must be funded. This report discusses weaknesses which should be addressed before further RDT&E budget requests for the SSN-21 Program are approved.

A draft of this report was provided to the Assistant Secretary of the Navy (Financial Management) for comments on March 31, 1992; however, comments were not received as of June 26, 1992. DoD Directive 7650.3 requires that all recommendations be resolved promptly. Therefore, the Assistant Secretary of the Navy (Financial Management) must provide comments on the recommendations by August 31, 1992. As required by DoD Directive 7650.3, the comments must indicate concurrence or nonconcurrence in the finding and each recommendation addressed to you. If you concur, describe the corrective actions taken or planned, the completion dates for actions already taken, and the estimated dates for completion of planned actions. If you nonconcur, state your specific reasons for each nonconcurrence. If appropriate, you may propose alternative methods for accomplishing desired improvements.

We were not able to quantify any potential monetary benefits. Appendix C summarizes other benefits of the audit.

Recommendations are subject to resolution under DoD Directive 7650.3 in the event of nonconcurrence or failure to comment. We also ask that your comments indicate
concurrence or nonconcurrence with the material internal control weakness highlighted in Part I.

We appreciate the courtesies extended to our audit staff. If you have any questions on this audit, please contact Mr. Rayburn H. Stricklin, Program Director, at (703) 693-0573 (DSN 223-0573) or Mr. Roger H. Florence, Project Manager, at (703) 693-0560 (DSN 223-0560). Appendix E lists the planned distribution of this report.

Robert J. Lieberman
Assistant Inspector General
for Auditing

Enclosure

cc:
Secretary of the Navy
Comptroller of the Department of Defense
Assistant Secretary of the Navy (Research, Development and Acquisition)
SSN-21 Program Manager
Office of the Inspector General

AUDIT REPORT NO. 92-122 (Project No. 1AL-5014.01) June 30, 1992

AUDIT REPORT ON THE RESEARCH, DEVELOPMENT, TEST, AND EVALUATION BUDGET ESTIMATES FOR THE SSN-21 SUBMARINE PROGRAM

EXECUTIVE SUMMARY

Introduction. The SSN-21 Class Attack Submarine (SSN-21) is a nuclear powered attack submarine that was designed to meet threats well into the 21st century. The SSN-21’s missions include antisubmarine and antisurface warfare, strike warfare, ocean surveillance, and electronic and mine warfare. Research and development (R&D) of the SSN-21 began in 1984, and as of August 1991, about $1.6 billion of research, development, test, and evaluation (RDT&E) funds had been expended for the SSN-21. At the time of the audit, the FY 1992 through FY 1997 RDT&E budget for continued development was $776.2 million. No funds were requested in the DoD FY 1993 budget; however, the Program Office believes that substantial requirements remain.

Objectives. The audit was to determine the extent that the SSN-21 RDT&E budget estimates for FY 1992 through FY 1997, which the Program Office considered synonymous with its cost estimates, were supported by specific requirements. We also determined the effectiveness of related internal control procedures.

Audit Results. The SSN-21 Program Office included $182.2 million (23 percent) in its RDT&E budget that was not identifiable to specific program requirements. The high contingency amounts were questionable and undocumented in either cost estimates or budget data.

Internal Controls. Internal controls were not in place to ensure that documentation supporting the FY 1992 through FY 1997 SSN-21 RDT&E budget was required during budget reviews and afterwards retained in the SSN-21 Program Office. Our review of internal controls is discussed in Part I.

Potential Benefits of Audit. The audit did not disclose quantifiable monetary benefits because the SSN-21 RDT&E budget is being realigned after the reduction of the Program to one or two submarines. However, implementation of the audit recommendations would result in improved budgeting for SSN-21 RDT&E effort.
Summary of Recommendations. We recommended that unsupported amounts in SSN-21 RDT&E budget estimates be identified and justified and that detailed documentation supporting the SSN-21 RDT&E cost and budget estimates be maintained.

Management Comments. We did not receive management comments on the draft report. We requested comments on this final report by August 31, 1992.
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This report was prepared by the Acquisition Management Directorate, Office of the Assistant Inspector General for Auditing, OIG, DoD. Copies of the report can be obtained from the Information Officer, Audit Planning and Technical Support Directorate, (703) 614-6303.
PART I - INTRODUCTION

Background

The SSN-21 Class Attack Submarine (SSN-21) was the Navy’s newest nuclear powered attack submarine and was expected to be operational well into the 21st century. The SSN-21 was intended to be quiet, fast, heavily armed, shock resistant, survivable and have an advanced combat system.

The advanced combat system is the AN/BSY-2 Submarine Combat System (Combat System). The Combat System is a state-of-the-art computer system that is planned to improve upon existing combat systems to meet SSN-21 operational requirements. The Combat System has been in development since 1986. Its purpose is to assist in detecting, classifying, and tracking targets, and it will enhance command and control operations.

Construction of the first SSN-21 began in calendar year 1989 with a planned delivery in 1995. However, because of construction difficulties, delivery slipped to calendar year 1996. As of December 1990, there was a planned procurement of 12 submarines with a total program acquisition cost of $33.6 billion (then-year dollars). During the audit, because of the reduction in threat, the Secretary of Defense recommended limiting production to one SSN-21 and terminating the SSN-21 Program. However, due to congressional action, production of a second SSN-21 is being considered. The SSN-21 Program Office will continue research and development (R&D) efforts to ensure the one or two SSN-21 submarines will be fully operational.

Objective

The overall audit objective was to determine the extent that the SSN-21 RDT&E budget for FY 1992 through FY 1997, which the Program Office considered synonymous with its RDT&E cost estimates, was supported by specific requirements. We also determined the effectiveness of related internal control procedures.

Scope

To accomplish the objectives, we selected budget elements, amounting to $553.7 million (71 percent), from the SSN-21 Program Office's RDT&E budget for FYs 1992 through 1997, which totaled $776.2 million and reviewed budget documentation to determine whether there was support for $310.8 million of the budgeted amounts. Further, in instances that we did not identify documentary support for the selected elements, we requested that the SSN-21 Program Office either develop the support or obtain it from the necessary sources. We did not evaluate the validity of the
documentary support that we requested from the SSN-21 Program Office originally because the documentation was received too late to permit its evaluation and subsequently because the SSN-21 RDT&E funding profile has been under revision. The Technical Assessment Division of the Office of the Assistant Inspector General for Auditing, OIG, DoD, assisted in the audit by evaluating the SSN-21 Program Office’s procedures for developing and supporting its RDT&E budget.

This program audit was performed from June 1991 to February 1992 and included a review of records dated from December 1987 to November 1991. The audit was made in accordance with auditing standards issued by the Comptroller General of the United States as implemented by the Inspector General, DoD, and accordingly included such tests of internal controls as were considered necessary. Appendix D lists the activities visited or contacted.

**Internal Controls**

The audit evaluated internal controls related to the supporting documentation maintained by the SSN-21 Program Office for its RDT&E budget. The audit identified a material internal control weakness as defined by Public Law 97-255, Office of Management and Budget Circular A-123, and DoD Directive 5010.38. Controls were not adequate to ensure that the SSN-21 Program Office had readily available supporting documentation and cost estimates for the individual tasks in its RDT&E budget. Recommendations 1. and 2. in this report, if implemented, will correct the weakness. A copy of the final report will be provided to the senior official responsible for internal controls within the Department of Navy.

**Prior Audits and Other Reviews**

In the last 5 years, there has been only one report related to the RDT&E budget for the SSN-21 Program. Office of the Inspector General, DoD, Report No. 89-027, "Report on the Review of the SSN-21 Submarine Program as a Part of the Audit of the Effectiveness of the Defense Acquisition Board Process," November 8, 1988, recommended that the SSN-21 life-cycle cost estimate include preplanned product improvements. The Navy nonconcurred, stating that there were no specific improvements planned because the submarine will meet established operational requirements. The Office of the Assistant Inspector General for Auditing continued to believe that there will be a need for product improvements to the SSN-21. However, potential future improvements could not be specifically identified at that point.
PART II - FINDING AND RECOMMENDATIONS

Budget Requirements for Research, Development, Test, and Evaluation

The SSN-21 Program Office included, in its FY 1992 through FY 1997 RDT&E budget, $182.2 million (23 percent) that was not identifiable to specific requirements. The SSN-21 Program Office included the $182.2 million in its budget as contingencies for potential problems such as redesign efforts, schedule slippages, and additional test requirements but did not document the basis for those amounts and did not maintain current cost estimates. As a result, questionable amounts were programmed and budgeted.

DISCUSSION OF DETAILS

Background

The Navy budgeting process provides for developing an annual budget estimate that can be used as the basis for allocating resources. The budget estimate is prepared for a 6-year period although funds are received only for the execution year.

Comptroller of the Navy Instruction 7102.2B, "Department of the Navy Budget Guidance Manual," April 23, 1990, states that budget estimates should result from meaningful and considered evaluations of resource requirements for Navy programs and should include all costs expected during the fiscal year. Costs may include estimated amounts for work to be performed during the fiscal year (for example, salaries and wages to be paid and material to be consumed), as well as other liabilities that have to be identified. Budget estimates should ensure that program costs are held to the minimum necessary to support and accomplish program objectives.

To assist in budget formulation, DoD guidance provides for program managers to utilize their program cost estimates. More specifically, DoD Instruction 5000.2, "Defense Acquisition Management Policies and Procedures," February 23, 1991, requires that program managers maintain a current cost estimate of their programs. DoD Manual 5000.2 states that documentation of cost estimates should provide sufficient information about the way the estimates are produced. Further, Secretary of the Navy Instruction 7000.19B, "Department of the Navy Cost Analysis Program," March 12, 1975, defines cost analysis as a process employed to assist in the overall Navy planning, programming, and budgeting processes. The Navy Instruction states that cost estimating is the result of a cost analysis that specifies the expected cost of acquiring an item or accomplishing tasks. Cost estimates are to be prepared using estimating
relationships, analogies, and cost models, and they should include other factors, such as risk and inflation. The Navy Instruction states that documentation of cost estimates is a required discipline, and a system for documenting and distributing all cost estimates is essential to credible cost estimating.

The RDT&E budget estimate for the SSN-21 Program addressed 13 functional areas, such as test and evaluation, propulsion, and weapons stowage and launch. The 13 functional areas had individual budget estimates that were prepared by fiscal year and included tasks that were to be accomplished by either contractors or Government activities. The task estimate was determined from estimated contract efforts, engineering estimates, historical data, and engineering and management judgments.

Development of the SSN-21 began in 1984 and as of August 1991, about $1.6 billion had been expended. At the time of the audit, the RDT&E budget for continued development effort for FYs 1992 through 1997 was $776.2 million; however, the DoD requested no RDT&E funds for the Program for FY 1993. As of February 1992, the Program Office estimated FY 1993 to FY 1997 RDT&E requirements at $732 million.

Evaluation of Budget Submission

The SSN-21 Program Office’s RDT&E budget included contingency funds of $182.2 million (23 percent) for FYs 1992 through 1997. Annually, the contingencies ranged from $13 million (11 percent) to $58.8 million (48 percent) within the 6-year budget estimate (Appendix A). For FY 1992, the contingencies totaled $27.3 million (17 percent of the budget). The contingencies were in each of the 13 functional areas and ranged from 2 percent to 64 percent over the 6-year period (Appendix B). Nine of the thirteen functional areas had contingencies exceeding 20 percent of their individual estimates. We classified the contingencies into three categories: management reserve, undefined tasks, and other contingencies.

Management reserve. The contingencies in the budget estimate for FYs 1992 through 1997 included a management reserve, totaling $26.6 million, for unidentified problems. The management reserve was identified in the Advanced Submarine Technology functional area in a task called "Total Design Development/Production Issues." In the description of this task, the SSN-21 Program Office stated that the management reserve was intended for major problems that could not be funded from other smaller reserves in each functional area. The SSN-21 Program Office also stated that the management reserve was the last available source of funding. The $26.6 million was based on identifying high-risk areas within the SSN-21 RDT&E Program and judgmentally
developing a management reserve value to provide funding support for the potential problems.

**Undefined tasks.** The budget included contingencies, totaling $54.5 million for FYs 1992 through 1997, that were not associated with specific tasks within the Test and Evaluation functional area. The SSN-21 Program Office had budgeted $172.3 million to accomplish test requirements in the Test and Evaluation Master Plan and had identified $101.7 million of specific resources required to accomplish the test and evaluation. However, $54.5 million of the funds was not associated with any specific testing requirement, and the remaining $16.1 million represented other contingencies discussed below. For example, the SSN-21 Program Office budgeted $8.9 million for FY 1993 test and evaluation; however, the budget documentation showed that only $2.5 million was associated with a specific task. The remaining $6.4 million represents funds for undetermined requirements that may develop in FY 1994. The SSN-21 Program Office had not identified the funds to specific tasks because of ongoing revisions to the Test and Evaluation Master Plan.

**Other contingencies.** The SSN-21 Program Office also had established additional contingencies of $101.1 million in the 13 functional areas. The SSN-21 Program Office established these contingencies to ensure that funds were available for potential problems within each functional area. Potential problem areas included redesign of submarine components, additional costs for research effort, schedule slippages, cost escalation, and continued development of components. Three examples that show the range of contingencies in the budget estimate are the submarine auxiliary, improved machinery performance, and the shock programs.

**Submarine auxiliary program.** The submarine auxiliary program for FYs 1992 through 1997 had $5.9 million (64 percent) in contingencies from a budgeted amount of $9.2 million. The submarine auxiliary program was for RDT&E efforts on submarine components, such as the air conditioning system. The SSN-21 Program Office established the $5.9 million contingency under the "System Test and Evaluation" task and included $520,000 (17 percent) in contingencies for FY 1992. The contingencies for FYs 1993 through 1997 ranged from 42 to 90 percent of budget requirements. The basis of the contingency value was the number of workyears that may be needed for yet to be identified task requirements to correct installation and testing deficiencies.

**Improved machinery performance program.** The improved machinery performance functional area for FYs 1992 through 1997 had $31.3 million (39 percent) in contingencies
from a budget of $79.3 million. This functional area consisted of SSN-21 RDT&E for the main propulsion unit. The value of the FY 1993 contingency was $7.6 million (39 percent) of the budgeted $19.3 million. The contingencies were for potential problems in shipboard installation, testing, and potential design changes to the propulsion unit.

Shock program. The shock program had $7.9 million (6 percent) in contingencies from a $137.3 million budget estimate for FYs 1992 through 1997. The shock program consisted primarily of shock testing SSN-21 components with underwater explosions. The contingency funds were identified in the "Program Support" task. Budget documentation described the task as "an overall program support task used by the SSN-21 Program Manager primarily as the contingency pot for each year." According to documentation, the amount of contingency funds was based on previous SSN-21 shock test programs.

Reasons for Contingencies

The budget contained the contingencies primarily because the SSN-21 Program Office decided that it was necessary to have extra funds for potential problems, such as redesign efforts, schedule slippages, and additional test requirements. Another factor leading to the high contingency estimates was the absence of an enforced requirement to document budget requirements fully.

Detailed Budget Documentation

The SSN-21 Program Office did not maintain detailed documentation to support its FY 1992 through FY 1997 RDT&E budget submission. We reviewed 5 of 13 functional areas for supporting documentation and the validity of the estimated budget value: test and evaluation, shock, target strength reduction, improved machinery performance, and silencing. The budget value of the 5 functional areas was $553.7 million (71 percent) of the budget estimate. Within the 5 functional areas, we reviewed 13 tasks, valued at $310.8 million, for estimating methodology and supporting documentation. From September through November 1991, for the purpose of our audit, the SSN-21 Program Office obtained supporting documentation for the FY 1992 through FY 1997 budget estimate. They obtained the documentation from the various contractors and laboratories performing the tasks, and the documentation consisted of cost projections. Two examples of the lack of detailed documentation at the SSN-21 Program Office for the functional areas that we reviewed follow.
Target strength reduction. The target strength reduction functional area included a "mold-in-place" task, which required state-of-the-art technology to provide a coating over the surface of the submarine. The estimate for the mold-in-place task was $19.5 million for FYs 1992 through 1997. The only readily available SSN-21 Program Office supporting documentation was the prime contractor's estimate for the FY 1991 value. As a result of our audit request, the SSN-21 Program Office obtained from the contractor on September 4, 1991, an unofficial preliminary cost estimate for FYs 1992 through 1994 of $ * million, while the budget estimate showed $12.5 million. We were unable to determine the basis of the remaining $ * million for FYs 1992 through 1994, as well as the $7 million ($19.5 million less $12.5 million) included in the budget estimate for FYs 1995 through 1997. Later in the audit, the SSN-21 Program Office provided a cost estimate, which the contractor prepared in September 1991, for the $7 million.

Shock. The shock functional area included a Big Pond task that consisted of constructing a shock test facility with a FY 1992 and FY 1993 budget value of $10 million. The Army Combat System Test Activity at Aberdeen Proving Ground was responsible for constructing the facility from FY 1991 through FY 1993. Budget supporting documentation was not available at the SSN-21 Program Office for the FY 1992 and FY 1993 budget value. During the audit, the SSN-21 Program Office obtained from the Army Combat System Test Activity documentation, dated September 3, 1991, that purportedly supported the budgeted value. The documentation was a budgetary cost profile," which contained a detailed breakout of the FY 1991 through FY 1993 estimate.

Reason for Lack of Documentation

The RDT&E budget for the SSN-21 Program lacked detailed documentation because the SSN-21 Program Office did not maintain a separate program cost estimate. The SSN-21 Program Office was using the budget estimate as the RDT&E cost estimate because the RDT&E program was about 70-percent complete. Further, SSN-21 Program Office officials believed that the budget estimate accurately reflected the RDT&E program costs.

The SSN-21 Program Office's adherence to DoD and Navy policy would have required it to prepare a program office estimate and maintain detailed documentation to support the RDT&E cost estimates. As a result, the SSN-21 Program Office would have readily available documentation to support its RDT&E budget submission for FYs 1992 through 1997.

* Contractor proprietary data deleted.
Conclusion

Program offices should plan, program, and budget for risks (or contingencies) in the development of systems. However, the amount of budgeted contingency funds should be proportionate to the risk associated with the stage of development that a system is in and should be identifiable and supportable. Without identifying the rationale for the estimated contingencies, DoD and Navy officials cannot have a reliable basis for planning, programming, and budgeting for the SSN-21 RDT&E program. More detailed justifications of RDT&E budget estimates, including those for contingencies, would facilitate budget review and help ensure that unsupported budget requirements are not funded. Maintaining detailed documentation is an essential part of the budget and cost estimating process. Detailed budget supporting documentation provides the basis for preparation of subsequent budget submissions and provides a tracking of individual cost elements in successive estimates.

RECOMMENDATIONS FOR CORRECTIVE ACTION

We recommend that the SSN-21 Program Manager:

1. Identify and justify to the Comptrollers of the Navy and Department of Defense the management reserves, undefined tasks, and other contingencies in research, development, test, and evaluation budget requests.

2. Maintain detailed documentation that supports the SSN-21 research, development, test, and evaluation Program Office cost estimates.

MANAGEMENT COMMENTS

Management comments to the draft report were requested on March 31, 1992; however, comments were not received as of June 26, 1992.

AUDIT RESPONSE TO MANAGEMENT COMMENTS

We request comments from the Assistant Secretary of the Navy (Financial Management) to this final report by August 31, 1992.
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PART III - ADDITIONAL INFORMATION

Appendix A - Amount of Contingency Funds to Total SSN-21 Research, Development, Test, and Evaluation Funds


Appendix C - Summary of Potential Benefits Resulting from Audit

Appendix D - Activities Visited or Contacted

Appendix E - Report Distribution
APPENDIX A: AMOUNT OF CONTINGENCY FUNDS TO TOTAL SSN-21 RESEARCH, DEVELOPMENT, TEST, AND EVALUATION FUNDS

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Percentage of Contingency Funds to Total RDT&E

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\(^1\) The contingency funds were identified from the supporting documentation on all 13 functional areas provided by the SSN-21 Program Office.

\(^2\) The total research, development, test, and evaluation funds were obtained from the August 1991 SSN-21 budget submission for FYs 1992 through 1997.

\(^3\) Test and evaluation did not budget a contingency fund in FY 1996.
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* The contingency percentage is based on the contingency funds to the FY 1992 through FY 1997, August 1991 budget.
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## APPENDIX C: SUMMARY OF POTENTIAL BENEFITS RESULTING FROM AUDIT

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APPENDIX D: ACTIVITIES VISITED OR CONTACTED

Office of the Secretary of Defense

Office of the Under Secretary of Defense for Acquisition, Washington, DC
Office of the Assistant Secretary of Defense (Program Analysis and Evaluation), Washington, DC
Office of the Comptroller of the Department of Defense, Washington, DC

Department of the Navy

Office of the Comptroller of the Navy (Other Investment and Development Branch), Washington, DC
Headquarters, Naval Sea Systems Command, Washington, DC
Naval Center for Cost Analysis, Washington, DC

Non-DoD Federal Organizations

General Accounting Office, Washington, DC
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APPENDIX E: REPORT DISTRIBUTION

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition
Assistant Secretary of Defense (Program Analysis and Evaluation)
Comptroller of the Department of Defense, Deputy Comptroller
(Management Systems)

Department of the Navy

Secretary of the Navy
Assistant Secretary of the Navy (Financial Management)
Comptroller of the Navy
Headquarters, Naval Sea Systems Command
Director, Office of Naval Technology
Naval Undersea Warfare Center

Defense Agency

Director, Defense Advanced Research Projects Agency

Non-DoD Federal Organizations

Office of Management and Budget
U.S. General Accounting Office, NSIAD Technical Information Center

Congressional Committees:

Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
Ranking Minority Member, Senate Committee on Armed Services
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
Ranking Minority Member, House Committee on Appropriations
House Committee on Armed Services
House Committee on Government Operations
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A. Report Title: Research, Development, Test and Evaluation Budget Estimates for the SSN-21 Submarine Program

B. DATE Report Downloaded From the Internet: 05/25/99

C. Report's Point of Contact: (Name, Organization, Address, Office Symbol, & Ph #): OAIG-AUD (ATTN: AFTS Audit Suggestions) Inspector General, Department of Defense 400 Army Navy Drive (Room 801) Arlington, VA 22202-2884

D. Currently Applicable Classification Level: Unclassified

E. Distribution Statement A: Approved for Public Release

F. The foregoing information was compiled and provided by: DTIC-OCA, Initials: ___VM___ Preparation Date 05/25/99

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