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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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MAY 30 1974

The Honorable Thomas J. McIntyre
Chairman, Research and Development
Subcommittee
Committee on Armed Services
United States Senate

Dear Mr. Chairman:

This is in response to your January 28, 1974, letter requesting an investigation of the funding of the Navy's Stable Semisubmerged Platform (SSP).

You expressed concern that the Navy may have built this experimental craft without having the specific approval and authorization of funds by the Congress. You stated that the program was not proposed to the Congress as a specific line item or project; instead, it was financed with funds provided for other purposes under Program 65851N, Facilities and Installation Support, before fiscal year 1974, and Program 65862N, RDT&E Instrumentation and Material Support, for the current fiscal year.

SSP construction costs were paid from the above funds. Navy officials said these funds were used because SSP would fulfill the need for a stable surface platform to support research projects at the Kaneohe, Hawaii, laboratory of the Naval Undersea Center and, therefore, properly came under the broad definition of general support equipment.

The Navy did not include estimated SSP construction costs in the budget submitted to the Department of Defense (DOD) and the Congress. Nor was SSP presented to the appropriate committees of the Congress before or during its construction.

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Because of the large sum--over $3.5 million--involved in constructing SSP and the anticipated use of SSP as a prototype to develop larger small waterplane area twin-hulled (SWATH) vessels, we believe that it would have been better if SSP had been disclosed in the Navy's budget proposal and brought to the Congress attention, so that it could have had the opportunity to weigh the relative need for SSP against other demands for research, development, test, and evaluation (RDT&E) funds.

Details of our investigation follow.

BACKGROUND

Section 412(b) of Public Law 86-149, as amended, which was in effect at the time the project was initiated, stated that:

> "(b) No funds may be appropriated after December 31, 1960, to or for the use of any armed force of the United States for the procurement of aircraft, missiles, or naval vessels, or after December 31, 1962, to or for the use of any armed force of the United States for the research, development, test, or evaluation of aircraft, missiles, or naval vessels, or after December 31, 1963, to or for the use of any armed force of the United States for any research, development, test, or evaluation * * * unless the appropriation of such funds has been authorized by legislation enacted after such dates."

For expenses necessary for constructing, acquiring, and converting vessels, generally the Navy requests authorization and appropriation of funds under its Shipbuilding and Conversion, Navy (SCN) budget. With respect to constructing and converting auxiliary ships and various service and landing craft--for example, barges and tugs--these are presented and justified in Budget Activity Number 5, Auxiliaries and Craft, of the SCN budget.

DOD's Budget Guidance Manual states that an experimental-type ship will be financed by an RDT&E appropriation. This includes experimental ships required to support an approved program, to experiment with new or radical ship concepts, or to demonstrate the military usefulness of new ship designs, configurations, or fabrication techniques, when the ship-type test vehicle itself can be predicted (1) to be consumed or expended in testing or (2) to have little or no operational usefulness in the force structure. Prototype ships, when designated by the Secretary of Defense, are also required to be financed by an RDT&E appropriation.

A new ship development project generally is funded initially from RDT&E exploratory development funds (6.2), and, if approved, is funded subsequently from RDT&E advanced development funds (6.3).

Exploratory development is funded to provide knowledge on how to solve specific problems. It provides the "bits and pieces" of technology which, when appropriately combined and used as a "technology base," make possible new capabilities.

Advanced development is funded for the developing and testing of equipment, including some studies designed to provide knowledge of the military usefulness, technical feasibility, and financial acceptability of systems under consideration. Examples of the kinds of projects included in advanced development are:

--Development and operation of research vehicles.
--Development of prototype subsystems of weapons.
--Development of one-of-a-kind systems.
--Concept formulation studies.

These projects are designed to provide information on the feasibility, cost, and capability of possible systems as inputs into the decision on whether to go into systems development.

When a naval laboratory believes that it has obtained sufficient information during exploratory development for a project to progress to advanced development, the laboratory attempts to find a sponsor, such as the Naval Ship Systems Command, to fund further development. When a sponsor is found, the project should then be identified as an item in the command's budget request for advanced development funds. The project must then compete for advanced development funds with other projects seeking funds. This competition exists not only within the Systems Commands but also within the chain of command within the Navy and DOD.

Management and Support (6.5) is a general "overhead" funding category for research and development (R&D). The Director of Laboratory Programs controls the Management and Support funds which pay for such items as the support of

--several laboratories;

--common-use facilities, such as missile ranges;

--general instrumentation and equipment for use in testing and evaluation; and

--studies not related to specific programs.

The Navy advised that, generally, 6.5 funds are provided to maintain a certain level of effort at each laboratory. A list of equipment each laboratory needs is submitted to the Director of Laboratory Programs each year. This list shows each item, its estimated cost, and a justification of why the laboratory needs it. The Director's office screens these lists to determine the amount of funds that can reasonably be allotted to each laboratory up to the limit imposed by the Five Year Defense Plan. Because of these limits, some equipment needed by the laboratories may be funded by sponsors of research projects or may be the subject of special requests for funding to the Director.

The DOD Budget Guidance Manual requires that, for each Management and Support program element, a list of every individual planned investment[1] item estimated at $100,000 or more must be submitted together with a justification for each item. These lists are prepared by the office of the Director of Laboratory Programs and submitted with the Naval Material Command budget to the Chief of Naval Operations. These lists, however, are used only as budget backup material and are not included in the DOD budget submissions to the Congress.

SCOPE OF REVIEW

We visited the Naval Undersea Center (NUC), San Diego; the Naval Undersea Center, Hawaii Laboratory, Kaneohe, Hawaii; and the Naval Ship Research and Development Center (NSRDC), Carderock, Maryland. We also reviewed documents and interviewed officials of the Office of Naval Research, the Naval Ship Systems Command, the Director of Laboratory Programs, the Navy Comptroller's Office, and of the Office of Director, Defense Research and Engineering.

HISTORY OF SSP

The interest at NUC in semisubmerged ships began in 1968. The need arose for a small, inexpensive support ship for an unmanned undersea vehicle which could travel as fast as large naval ships in all sea states. None of the ship

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[1]An R&D investment includes those items costing more than $1,000 which are expected to have a useful life of more than 1 year and are expected to benefit more than one R&D project. However, prototypes and facilities financed with RDT&E funds as part of an individual R&D technical project (because they are expected to benefit only that project) are considered expenses rather than investments, regardless of their cost or expected life.

concepts proposed in the literature were considered acceptable to laboratory personnel, so the semisubmerged ship design was introduced. This marked the beginning of the semisubmerged ship program at NUC.

The semisubmerged design consists basically of two parallel torpedo-like hulls, submerged to a depth of about 2 diameters and attached to an above-water platform by four vertical struts. Horizontal fins and control surfaces attached to the hulls provide dynamic stability and permit full automatic control over pitch, heave, and roll.

The Navy Invention Evaluation Questionnaire prepared in 1968 to support a patent application on the design stated that the Navy had considerable interest in the invention. In addition, it stated that "If adopted the invention would have considerable use for patrol crafts, destroyers, destroyer escorts, and other fighting ship designs." The inventor received a patent in November 1971.

We were informed that the anticipated need for the support ship at NUC did not materialize. However, because the semisubmerged design appeared so attractive, NUC personnel began to determine the best type of self-propelled model for investigating its dynamic characteristics. Several types were considered. One was a self-propelled, radio-controlled, model approximately the same size as a 5-foot towed model. A second possibility was a 12-foot model which could be tested in the towing and sea-keeping basins at NSRDC. A third possibility was a one-man, 12-foot craft which could be tested in San Diego Bay and later tested in the towing tanks at NSRDC. A fourth possibility was a 20-foot, eight-man craft powered by two outboard motors which would not only be used to investigate the dynamic characteristics of the semisubmerged design but also be of use in carrying out other research programs at NUC. This led to the fifth possibility which was a 30-ton model which would be of greater use to NUC; it would be large enough to provide good performance in

the ocean offshore of San Diego, under nearly all weather conditions.

After studying the possibilities, a proposal was prepared to develop a 5-foot, radio-controlled model to explore various parameters, test a 12-foot version at NSRDC, and build the 50-ton model.

In the fall of 1969, the proposal was discussed with prospective sponsors in the Naval Ship Systems Command, the Naval Air Systems Command, and the Office of Naval Research. The Technical Director at NUC also asked the inventor to think of possible uses for a semisubmerged ship at NUC. When the Technical Director became aware that NUC-Hawaii was planning to build a barge to support certain scientific research projects, he asked the inventor to visit NUC-Hawaii to determine if the semisubmerged ship concept would meet its requirements.

NUC-Hawaii personnel reviewed the film which documented the inventor's experiments with a 5-foot model. On January 23, 1970, they met to discuss the surface support for their program. By May 12, 1970, NUC-Hawaii had completed a draft entitled "Preliminary Proposal for an 80-Foot Twin-Hulled Semi-submerged Ship Prototype." The draft stated that the "boat will serve primarily to meet the laboratory needs for a support platform." Other purposes were also listed. During a working session with Director of Laboratory Programs on May 13, 1970, some changes were suggested. This draft, with changes, became the final proposal for the SSP dated June 5, 1970.

However, since the sea conditions were much worse in Hawaii than San Diego and since payloads of 20 tons or more were being considered, NUC decided to increase the size of the large model from 50 tons to 150 tons. The resulting design eventually became known as SSP, and, through further design changes, its displacement increased to the present 190 tons. SSP's predicted performance includes a maximum

speed of 25 knots; a range of 450 nautical miles; and a payload of 32.5 tons on the weather deck, which is in addition to 18.9 tons of fuel and ballast.

Initial funding for detailed design and construction of SSP was provided on June 24, 1970, by the Director of Laboratory Programs from fiscal year 1970 RDT&E appropriations. These funds were charged to the Instrumentation and Equipment program of the Management and Support category. The descriptive summary of this program stated that it

> "* * * provides for the procurement of general purpose research equipment, items of range instrumentation, support equipment such as machine tools and also collateral equipment associated with Military Construction projects for all RDT&E activities under the Chief of Naval Material. General purpose research equipment is a continuing requirement of all RDT&E activities and it includes such items as power calibrators, voltmeters, oscilloscopes, ultrasonic cleaners, cameras, amplifiers, microscopes, etc. * * * Range Instrumentation includes such items as cinethodolites, recorders, high speed cameras, tracking mounts, telemetry equipment, etc. * * *."

Navy officials told us that, when the request for funds was made in June 1970, the Navy expected design and construction would be completed by August 1971. Therefore, estimated SSP costs were not included in the Navy's request for 6.5 funds in the RDT&E budget for fiscal year 1971 because NUC's request for funds arrived too late to be included in that budget. Further, it was not included in the fiscal year 1972 budget because these funds would not have been available until July 1, 1971. Consequently, SSP was never included on the annual list of Range Instrumentation and Equipment needed by NUC, which is submitted to the Director of Laboratory Programs, nor was SSP ever included on the

list of investments costing more than $100,000 that the Navy submits with its annual RDT&E budget request to DOD.

In August 1971 the Naval Ship Systems Command reviewed SSP's design package and approved it for construction. SSP originally was to be constructed at the Pearl Harbor Naval Shipyard. However, in January 1972 the shipyard submitted a cost estimate of $2,760,000, which was more than double an earlier estimate. This prompted a search for alternative locations for construction of the craft.

The Coast Guard Yard at Curtis Bay, Maryland, was selected to construct the SSP at an estimated labor cost of $1.5 million to $2 million. With additional material costs of about $200,000, the total construction cost was estimated at $1.7 million to $2.2 million. Construction began in the spring of 1972 and was completed in the fall of 1973. SSP is currently at Annapolis, Maryland, undergoing test and evaluation by NSRDC personnel. We were informed that data obtained from these tests could be used to support a Navy request for an advanced development project concerning a 2,000- to 3,000-ton SWATH-type vessel. SSP is a 190-ton SWATH-type craft.

Funding data provided by the Navy shows that, as of February 1974, approximately $3.6 million has been spent for constructing SSP. Approximately $950,000 more has been spent for studies and analyses related to the SSP program. These studies and analyses were generally directed toward investigating further application of the semisubmerged ship concept within the Navy.

For example, a report dated September 1971 entitled "Naval Feasibility Study of the S3, a New Semisubmerged Ship Concept," contained an initial assessment of the utility of semisubmerged ships in future naval operations. The following 14 possible mission applications were presented and evaluated.

Type	Desig-nation	Design speed knots	Displace-ment, long tons
ASW escort	DE	36	2,000
Air defense escort	DEG	33	3,000
Surface attack ship	DA	38	1,000
Small VTOL carrier	CV	34	9,000
VTOL support ship	ARVT	30	15,000
Command ship	CC	33	2,500
Patrol ship	DP	30	1,800
Ballistic missile ship	BMS	33	7,000
Antiballistic missile ship	ABMS	33	18,000
Mine detection ship	MSO	20	250
Submarine rescue ship	ASR	30	4,000
Coast Guard cutter	WMEC	30	2,800
Oceanic research	AGOR	25	1,500
Hospital ship	AH	20	12,000

The enclosure shows funded research projects related to SSP.

AGENCY COMMENTS

In view of the limited time available, we did not obtain written comments from the Navy on this report. However, we did discuss it with Navy officials.

In their opinion, specific authorization and approval of the Congress for constructing SSP was not required since SSP is neither a vessel nor an experimental research project. Because of SSP's limited range, lack of accommodations for personnel, and singular purpose for which it can be used (support of research), SSP is not considered a vessel. SSP is a vehicle laboratory personnel will use to support and conduct various research projects.

SSP also is not considered an experimental research project even though it may provide useful information for research projects on SWATH vessels. SSP will be used to

fulfill the need for a support platform from which research will be conducted. Therefore, in the Navy's view, it was proper to pay for the construction with Management and Support funds because SSP is considered part of the laboratories' general instruments and equipment.

CONCLUSIONS

Initial concept studies for SSP-type craft were funded with independent exploratory development funds. Management and support funds were used for the design and construction of SSP. Exploratory development funds were also used for seaworthiness and performance testing of SSP as well as for maintenance and operation during these tests.

The use of management and support funds for SSP may not be typical of most Navy expenditures made from this program category, and we intend to explore this matter during our follow-on study. The use of these funds, however, together with exploratory development funds for SSP, was in accordance with DOD and Navy guidelines.

SSP currently is being used to prove the design concept and to provide data for use in developing and designing large SWATH vessels. SSP is scheduled to be assigned to NUC-Hawaii during calendar year 1974 for use as a stable surface platform to support research projects.

The Navy did not include estimated SSP construction costs in the budget submitted to DOD and the Congress. Nor was SSP presented to the appropriate committees of the Congress before or during its construction.

The appropriations for DOD are made in large amounts and fund a great number of individual programs and purposes. Hundreds of line items are included in each appropriation. The committees which handle defense appropriations rely on

detailed justifications, descriptive summaries, and presentations at hearings from departmental witnesses to supply details of the budget request.

Because of the large sum--over $3.5 million--involved in constructing SSP and the anticipated use of SSP as a prototype to develop larger SWATH vessels, we believe that it would have been better if SSP had been disclosed in the Navy's budget proposal and brought to the Congress attention, so that it could have had the opportunity to weigh the relative need for SSP against other demands for RDT&E funds.

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Your January 28, 1974, letter noted the possibility the Navy may be pursuing other major R&D projects or tasks in the same manner without either the required knowledge or specific authorization of the Congress. We are examining this matter and shall report our findings to you with recommendations, if appropriate, at the earliest practicable date.

As your office authorized we are sending copies of this report to the Chairmen of the House and Senate Committees on Appropriations and on Government Operations; the Chairman of the House Committee on Armed Services; the Secretary of Defense; the Secretary of the Navy; and the Director, Defense Research and Engineering. Please let us know if you desire further details.

Sincerely yours,

Acting Comptroller General
of the United States

Enclosure

ENCLOSURE

FUNDED RESEARCH PROJECTS

RELATED TO SSP AND SWATH AS OF FEBRUARY 2, 1974

NUC-SAN DIEGO

Title	Project element	Fiscal year	Sponsor	Funds received	Costs as of 2-2-74
SSP:					
High Speed Ship with Submerged Hulls	6.2	1969	NUC/IED (note a)	$ 16,462	$ 16,462
		1970	NUC/IED	70,902	70,902
				87,364	87,364
Stable Semisubmerged Platform Construction	65862N	1970	DLP (note b)	250,000	-
		1971	DLP	360,000	453,922
		1972	DLP	982,000	1,263,563
		1973	DLP	1,599,000	1,460,026
		1974	DLP	314,000	194,959
		1974	NSRDC	75,000	221,171
				3,580,000	3,593,641
Automatic Control System for the Semisubmerged Platform	65862N	1972	DLP	18,000	18,000
		1973	DLP	12,000	12,338
		1974	DLP	70,000	14,389
				100,000	44,727
Support Seaworthiness and Performance Tests of the 190-Ton Stable Semisubmerged Platform (SSP)	62754N	1972	NAVSHIPS (note c)	10,000	10,446
		1973	NSRDC	50,000	49,646
				60,000	60,092
SSP Maintenance and Operation	62754N	1974	NSRDC	130,000	-
Total				$3,957,364	$3,785,824

ENCLOSURE

Title	Project element	Fiscal year	Sponsor	Funds received	Costs as of 2-2-74
RELATED TO SSP:					
Ship Feasibility Study - Twin Hulled SSS	62512N	1970	NAVSHIPS	$ 25,000	$ 25,000
Advanced Platform Concepts - Twin SSS Concept	62211N	1970	NAVAIR (note d)	40,000	35,441
		1971	NAVAIR	-	4,559
				40,000	40,000
Navy Mission Analysis for Twin-Hulled SSS Concepts	65104N	1970	ONR (note e)	69,000	43,700
		1971	ONR	-	25,014
				69,000	68,714
Towed Fuel Pods for Semi-submerged Ships	62756N	1972	NUC/IED	29,614	29,614
Airbase Potential of Semi-submerged Ships	62211N	1971	NAVAIR	28,000	27,442
		1972	NAVAIR	6,000	5,259
		1973	NAVAIR	-	741
				34,000	33,442
SWATH Design Studies	62754N	1971	NAVSHIPS	20,000	22,991
		1972	NAVSHIPS	90,000	88,287
		1973	NSRDC	100,000	93,999
		1974	NSRDC	60,000	60,109
				270,000	265,386
Testing of 3,000-Ton Semisubmerged Ship Model	62756N	1973	NUC/IED	31,000	31,116
		1974	NUC/IED	12,000	6,321
				43,000	37,437
Structural Design of S3 Semisubmerged Ships	61152N	1973	NUC/IR (note f)	90,059	84,578
		1974	NUC/IR	-	9,525
				90,059	94,103
Marine Corps Applications for S3	62756N	1973	NUC/IED	50,000	49,805
		1974	Marine Corps	30,000	11,271
				80,000	61,076
SWATH ASW Mission Performance Analysis	62754N	1973	NSRDC	50,000	24,362
		1974	NSRDC	20,000	42,735
				70,000	67,097

ENCLOSURE

Title	Project element	Fiscal year	Sponsor	Funds received	Costs as of 2-2-74
RELATED TO SSP (continued):					
Advanced Naval Small Waterplane Area Twin Hull (SWATH) Ship Sonar System	62754N	1973	NSRDC	$125,000	$ 94,270
		1974	NSRDC	-	31,195
				125,000	125,465
Stable Semisubmerged Platform (SSP) (Mission System Experiments)	62756N	1974	NUC/IED	50,000	-
SWATH Ship Mission/Equipment Analyses and Program Support	62754N	1974	NSRDC	20,000	11,507
Medical Support Installation for SWATH SHIPS	63706N	1974	BUMED (note g)	8,000	7,294
				$953,673	$866,135
PROPOSED AND UNFUNDED PROJECTS:					
Semisubmerged Platform Helicopter Demonstration	6.5				
Semisubmerged Ship (SSS) Feasibility Study on Structure	6.2				
Sonar Suits for S3 Semisubmerged Ships	6.2				
Develop New Structural Designs & Fabrication Techniques for a 3,000-Ton All Aluminum SSS (S3)	6.2				
SSP Acrylic Observation Domes	63713N				
Ship Feasibility Study: SSS Design Form	N/A				

[a]Naval Undersea Center/Independent Exploratory Development.

[b]Director Laboratory Programs.

[c]Naval Ship Systems Command.

[d]Naval Air Systems Command.

[e]Office of Naval Research.

[f]Naval Undersea Center/Independent Research.

[g]Bureau of Medicine.

Source: NUC, San Diego.