



094726

# Overhaul Of The Nuclear Submarine Nautilus

Department of the Navy

**BY THE COMPTROLLER GENERAL  
OF THE UNITED STATES**

LCD-75-406

108975

094726

JAN. 30, 1975



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

B-180703

The Honorable William Proxmire  
United States Senate

Dear Senator Proxmire:

Your letter of February 19, 1974, asked us to look into the current overhaul of the nuclear submarine U.S.S. "Nautilus." In particular, you asked for information on the overhaul's initial cost, estimated cost growth, and justification and on the appropriation accounts detailing where the money came from for the overhaul.

You also asked us to determine whether any Federal regulations or laws had been violated in suppressing information about the Nautilus or in harassing Government employees. Since the Civil Service Commission addressed the latter issue in a January 22, 1974, hearing, your staff asked us to not pursue these matters further.

The estimated cost to complete the overhaul is \$48.1 million. This is about \$23 million more than the planned and budgeted cost of about \$25.1 million. Some of the factors which the Navy and contractor claim caused this overrun follow.

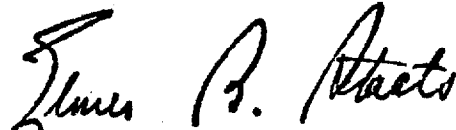
- The Navy delayed the start of the Nautilus overhaul 7 months because of cost overruns on other ship overhauls, and this disrupted the contractor's overhaul planning.
- The contractor was unable to meet production schedules because of strikes and difficulties in rehiring and training people.
- The size of the work package grew considerably during the overhaul, and there was a large amount of unexpected structural work.
- The Navy temporarily revoked the contractor's authorization to handle radioactive material because of its poor radiological control practices.
- The Navy did not keep enough spare parts available in the supply system because the Nautilus, and some of its components, were unique.

--The Navy's forecast of the overhaul cost was inaccurate, and the Nautilus needed more work than originally expected. Also the man-hours to do the planned work increased because rework requirements were greater than expected.

Appendix I contains more details on the information you requested. As your office directed, we obtained comments from Electric Boat and the Navy and have incorporated them in our report where applicable.

We do not plan to distribute this report further unless you agree or publicly announce its contents.

Sincerely yours,

A handwritten signature in cursive script that reads "James B. Stacks". The signature is written in black ink and is positioned above the typed name and title.

Comptroller General  
of the United States

INFORMATION REQUESTED ON THE  
OVERHAUL OF THE NAUTILUS

BACKGROUND

The U.S.S. "Nautilus," built by the Electric Boat Division, General Dynamics, Groton, Connecticut, was launched on January 21, 1954; commissioned on September 30, 1954; and delivered to the Navy on April 22, 1955, at a construction cost exceeding \$58.2 million (including Government-furnished materiel).

The Nautilus was the world's first nuclear-propelled ship and is the only submarine of its class. Since July 1970 it has been used primarily to support fleet exercises and fleet training. The Navy pointed out that, upon completion of its overhaul and after an approximate 4-month shake-down and postoverhaul refresher training period, the Nautilus will be a capable attack submarine and will contribute to the Navy's overall submarine force posture. The Nautilus is currently scheduled for forward deployment later this fiscal year; however, it will lack capabilities of newer attack submarines and will not have the SUBSAFE program completed, which enables a submarine to operate at greater depths.

If the Navy criterion of a 25-year life for a submarine were applied, the Nautilus would be decommissioned in 1979. The Navy, however, has not yet decided on a decommissioning date.

The Nautilus has been overhauled twice. The first overhaul, with refueling, was done at the Portsmouth Naval Shipyard, Portsmouth, New Hampshire, from June 3, 1959, to August 10, 1960; it cost \$7,128,760 and took 127,825 man-days. The second overhaul, which was without refueling, was also done at Portsmouth. It cost \$17,753,521 and took 258,904 man-days from January 20, 1964, to May 1, 1966. The ship was also refueled in 1968 at a cost of \$5,132,000.

The current overhaul is being done by Electric Boat under a cost-plus-incentive-fee contract. The overhaul began on August 15, 1972, and the current estimated delivery date is mid to late December 1974.

--Although the overhaul is expensive, its cost is much lower than the estimated \$200 million needed to construct a new submarine.

#### OVERHAUL COST AND COST GROWTH

The original basic target contract price that Electric Boat and the Navy negotiated and agreed to was \$14.1 million. Naval officials told us that when the contract was signed both parties knew additional work was going to have to be done. After the additional work was outlined, Electric Boat and the Navy agreed on a revised contract target price of \$24.3 million which the Navy considered to be a reasonable estimate for the total work.

Electric Boat experienced overruns above the negotiated target price of \$24.3 million and, as of August 23, 1974, estimated that it would cost \$48.1 million to complete the overhaul. This is about \$23 million more than the Navy's planned and budgeted cost of about \$25.1 million which was based on the costs to overhaul other submarines of comparable age.

On the basis of Electric Boat's required cost reports for the overhaul, the categories with the most significant cost growths were:

1. Nonnuclear services (provided for all work in systems other than the reactor plant and performed on a submarinewide basis, such as supervision, design and engineering, drydocking, quality control, cleaning and utilities)--\$13.9 million.
2. Nuclear services (provided for all nuclear systems work and including supervision, radiological controls, surveys and monitoring, chemistry and reactor compartment preparation)--\$5.8 million.
3. Repair and refurbishment of ship systems other than the nuclear system--\$2 million.

An Electric Boat official told us that the overhaul was scheduled to begin in January 1972. A naval official told us that the start of the overhaul had been delayed until August 1972 because of funding problems. These arose primarily from cost overruns on overhauls on the Navy's 1972 ship

## APPENDIX I

Naval officials explained that the following factors increased Electric Boat's cost and problems in scheduled performance during the overhaul.

- Electric Boat had laid off skilled workers early in 1972 and had problems in rehiring and retraining workers.
- Vital engineering support personnel went on strike in the summer of 1973, and this caused production schedules to slip.
- Electric Boat had a major problem with welding rework on the Nautilus, because many welders were not fully trained.
- Electric Boat's authorization to handle radioactive material associated with naval nuclear propulsion plants was suspended on February 27, 1973, because of its poor radiological control practices. The authorization was restored in May 1973 after the personnel working with radioactive materials were given intensive training.

Electric Boat officials said the following problems arose during the overhaul.

- Subassemblies made by subcontractors did not fit the major components because plans and drawings were inaccurate.
- Defects showed up in the hull structure and had to be repaired.
- Systems that were more deteriorated than expected had to be replaced.
- The Navy did not keep enough spare parts in the supply system because some of the Nautilus components were unique.

Electric Boat is experiencing similar cost overruns on the overhauls of two fleet ballistic missile submarines. Overhaul of the U.S.S. "Andrew Jackson," initially estimated at \$30.9 million, is now estimated at \$51.3 million; overhaul of the U.S.S. "Lafayette," initially estimated at \$31.2 million, is now estimated at \$48.5 million.

## APPENDIX I

Appropriation Account Data For the  
U.S.S. "Nautilus"  
as of October 31, 1974

<u>Fiscal year</u>	<u>Appropriation subhead</u>	<u>Bureau control number</u>	<u>Amount</u>	<u>Fund- ing cate- gory</u>
1971	17X1810.7451	08995	\$ 97,759	OPN
	17X1810.7451	22995	95,618	OPN
	17X1810.7451	24995	24,500	OPN
	1711804.602A	00060R	<u>1,668,900</u>	O&MN
	Fiscal year total		<u>1,886,777</u>	
1972	1721319.2425	08995	166,768	OPN
	1721810.7452	22995	87,681	OPN
	1721804.602A	00060R	1,113,923	O&MN
	1721319.2425	00024	<u>673,719</u>	RDT&E
	Fiscal year total		<u>2,042,091</u>	
1973	1731810.7453	08995	2,306,821	OPN
	1731810.7453	22995	1,825,321	OPN
	1731810.7453	24995	68,955	OPN
	1731804.602A	00060R	15,391,196	O&MN
	1731319.2435	00024	812,806	RDT&E
	1731804.2472	00024	6,266	O&MN
	1731804.2479	00024	3,738	O&MN
	1731810.7453	07291	5,000	OPN
	1731810.1713	08693	<u>15,000</u>	OPN
	Fiscal year total		<u>20,435,103</u>	
1974	1741804.602A	00024	7,189	OPN
	1741804.602A	00060R	16,060,385	O&MN
	1741319.2445	00024	826,168	RDT&E
	1741810.74UL	066960/0	37,956	OPN
	1741810.81HW	30048	<u>690</u>	OPN
	Fiscal year total		<u>16,932,388</u>	
1975	1751804.602A	0060R	<u>6,541,667</u>	O&MN
	Fiscal year total		<u>6,541,667</u>	
	Total		<u>\$47,838,026</u>	

report that the Navy needed to continually evaluate its estimating procedures to look for opportunities to improve them.

The Navy revised its estimating procedures and used these new procedures to prepare the 1974 overhaul program. Since this revision was so recent, we could not determine its effect. Hopefully it will improve the planning for overhauls and will result in more realistic estimates of overhaul costs.

#### NAVY MANAGEMENT

In May 1973, when Navy officials first learned that an overrun was going to occur, they were overly optimistic and were hopeful that Electric Boat could hold the overrun to a minimum. Navy officials told us that, as the overrun grew, they had no alternative but to complete the overhaul and try to control the costs in the best way possible.

In an attempt to control the overhaul cost, the Navy:

- Entered into an overhead-ceiling agreement for calendar years 1972-75.
- Monitored efforts to improve production in various areas, including radiological control, welding, production scheduling, and planning.
- Requested certain reporting changes to improve the monitoring of Navy contracts and to predict delays or cost overruns.

#### CONCLUSIONS

From the time the contracting officer determined that Electric Boat should do the overhaul because of its unique knowledge and capability, the Navy has been unable to effectively forecast how long the overhaul would take and how much it would cost. Since the delay of the overhaul from January to August 1972, problems have plagued the overhaul. Even with the Navy's implementing a number of steps to control the cost, the latest overhaul estimate is \$48.1 million and could go higher.