

DOCUMENT RESUME

07241 - [B2687748]

Extending the Service Life of Aircraft Carriers: Where Should the Work Be Done? LCD-78-435; B-133170. September 22, 1978. 22 pp. + appendix (1 pp.).

Report to Rep. Paul Trible; Sen. Harry F. Byrd, Jr.; by Elmer B. Staats, Comptroller General.

Issue Area: Facilities and Material Management (700);
Appropriate Consideration of All Factors in Deciding to Make or Buy Needed Goods or Services. (1915).
Contact: Logistics and Communications Div.
Budget Function: National Defense: Department of Defense - Military (except procurement & contracts) (051).
Organization Concerned: Department of the Navy; Department of the Navy: Philadelphia Naval Shipyard, PA; Newport News Shipbuilding and Drydock Co.
Congressional Relevance: House Committee on Armed Services; Senate Committee on Armed Services. Rep. Paul Trible; Sen. Harry F. Byrd, Jr.
Authority: OMB Circular A-76.

The Navy has established a service life extension program to extend by 15 years the normal 30-year life of its four Forrestal Class aircraft carriers. The Navy has estimated that it will take 28 months to do the work on each carrier, and it plans to do the work between October 1980 and November 1989. The U.S.S. Saratoga is the first carrier scheduled for the extension program, and the Navy decided that the work on this carrier would be done by the Philadelphia Naval Shipyard at an estimated cost between \$554 million and \$569 million.

Findings/Conclusions: The Navy considered having the Newport News Shipbuilding and Dry Dock Company in Virginia do the work on contract and estimated that it would cost \$539.1 million. Although the Navy concluded that for decisionmaking purposes the costs were about equal, it made the site selection decision on the basis of other factors. The Navy's methodology for estimating the various cost elements were reviewed for reasonableness and consistency and adjustments were made in the Navy's estimates where appropriate. The net effect of the inconsistencies and errors made by the Navy was that the estimated costs were understated at Philadelphia and overstated at Newport News. The revised estimates showed that the extension program would cost between \$88.9 million and \$105.2 million less at Newport News. Additional costs should also have been considered, including the costs of hiring and training new personnel at Philadelphia.

Recommendations: The Secretary of the Navy should reevaluate the decision to do the work on the U.S.S. Saratoga at the Philadelphia Naval Shipyard and should determine whether the decision can still be justified. (SC)

7748

REPORT BY THE
Comptroller General
OF THE UNITED STATES

Extending The Service Life Of Aircraft Carriers--Where Should The Work Be Done?

The Navy plans to extend by 15 years the service life of four aircraft carriers. The Navy estimated it will take 28 months to do the work on each carrier, and it plans to do the work between October 1980 and November 1989.

The U.S.S. Saratoga is the first carrier scheduled, and the Navy decided to have the Philadelphia Naval Shipyard do the work on the U.S.S. Saratoga at an estimated cost of \$554 to \$560 million.

The Navy considered having the work done on contract by the Newport News Shipbuilding and Dry Dock Company and the estimated cost was \$539.1 million.

This report discusses the Navy's cost estimates and other factors the Navy considered in deciding to do the work at Philadelphia and recommends that the decision be validated again.





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

B-133170

The Honorable Harry F. Byrd, Jr.
United States Senate

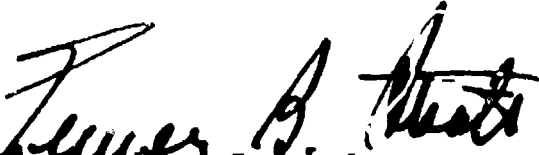
The Honorable Paul Trible
House of Representatives

As requested, we examined the Department of the Navy's decision to send the aircraft carrier U.S.S. Saratoga to the Philadelphia Naval Shipyard for the service life extension program.

As agreed, we limited our review to the Navy cost estimates for doing the work at either the Philadelphia Naval Shipyard or the Newport News Shipbuilding and Dry Dock Company and to the other factors considered in reaching the decision to have the work done at Philadelphia.

As you requested, we have not presented this report to the Department of the Navy for written comment; however, we have discussed the results with Navy officials and considered their comments in preparing this report.

This report is also being sent to the Members of Congress listed in appendix I. As arranged, copies are being sent to the Senate Committees on Appropriations, Armed Services, Budget, and Governmental Affairs; the House Committees on Appropriations, Armed Services, Budget, and Government Operations; the Office of Management and Budget; and the Departments of Defense and the Navy. Copies will be available to other interested parties who request them.


Comptroller General
of the United States

D I G E S T

The Navy has established a program--called the service life extension program--to extend by 15 years the normal 30-year life of its 4 Forrestal Class aircraft carriers to insure that it has a total of 12 deployable aircraft carriers to year 2000. The Navy estimated that it will take 28 months to do the work on each carrier, and it plans to do the work between October 1980 and November 1989.

The U.S.S. Saratoga is the first carrier scheduled for the extension program, and the Navy decided that the work on the U.S.S. Saratoga would be done by the Philadelphia Naval Shipyard at an estimated cost between \$554 million and \$569 million. The lower estimate assumes that the Congress passes the proposed wage board reform bill which would lower future pay raises for Federal blue collar employees; the \$15 million higher estimate assumes no reform.

The Navy considered having the Newport News Shipbuilding and Dry Dock Company in Virginia do the work on contract and estimated that it would cost \$539.1 million. Although the cost estimate was lower, the Navy said the difference is insignificant in relation to the total estimated cost and the estimates are rough estimates based on many unknown factors. For this reason, the Navy concluded that for decisionmaking purposes the costs were about equal and made the site selection decision on the basis of other factors.

EVALUATION OF COST ESTIMATES

GAO found that the Navy had to make assumptions concerning the size and complexity of the work package because the specific work is currently being defined. In addition, the Navy made several assumptions about future conditions

which may or may not be correct. The final work package is not expected before February 1980. Total costs cannot be determined with any degree of accuracy at this time and could be off by millions.

GAO reviewed the Navy's methodology for estimating the various cost elements for reasonableness and consistency and adjusted the Navy's estimates where appropriate. The revised estimates should not be considered as GAO's estimates of the costs for the actual program, but rather as comparative costs which could be used with other factors to evaluate the Navy's site selection decision.

GAO's review disclosed the following differences in assumptions, inconsistencies, and errors in the Navy's cost study.

- Using military personnel to do 395,000 labor days of work at Philadelphia which lowered its estimated costs, but not considering the use of military personnel at Newport News to lower its estimated costs.
- Projecting labor and overhead rates on the basis of bids for ship construction when actual rates were available for making projections.
- Including profit on shipbuilder material at Philadelphia and double profit on this material at Newport News.
- Estimating contract modification costs at both Newport News and Philadelphia using the Newport News basic construction price and a factor used for estimating changes to contracts for follow-on ships rather than lead ships.
- Estimating military personnel costs in discounted 1977 dollars and all other costs at the anticipated price levels that will exist in the future.

The net effect of these inconsistencies and errors was that the Navy understated the estimated costs at Philadelphia and overstated them at Newport News. The revised estimates showed that it would cost between \$88.9 million and \$105.2 million less at Newport News. This compares to the Navy's estimates of \$14.9 million to \$29.9 million less at Newport News.

GAO's review also disclosed that additional costs should have been considered such as the costs to hire and train new personnel at Philadelphia to perform the work and the costs for facility modifications at both Philadelphia and Newport News to accommodate the program.

OTHER FACTORS

As indicated above, the Navy made the site selection decision on the basis of other factors as well as costs. According to the Navy, the relevant factors were:

- There are learning advantages for both the production work force and shipyard management by having the overhauls done in series at one shipyard.
- The Philadelphia Naval Shipyard is the secondary aircraft carrier shipyard on the east coast, and it met all the Navy's basic criteria required for accomplishing the program on all four ships.
- The Newport News shipyard could perform the work on the U.S.S. Saratoga, but construction of a new aircraft carrier at the shipyard would preclude it from accomplishing the work on the follow-on ships.

The Navy considered (1) sending the first ship to Newport News and follow-on ships to Philadelphia and (2) sending all four ships to Philadelphia.

The Navy identified the following advantages to the first alternative.

- Utilizes available carrier capability at Newport News during fiscal years 1980-82.
- Provides an orderly and steady buildup of the personnel required at Philadelphia to perform the work.
- Provides increased workload for Philadelphia during the buildup.

The Navy identified only one advantage to the second alternative which was that it provides increased workload for Philadelphia. However, the following disadvantages were identified by the Navy.

- Short training lead time at Philadelphia to develop aircraft carrier expertise.
- Requires the use of the ship's crew to perform part of the work.
- Requires rapid buildup in Philadelphia from the 7,700 people in December 1977 to 9,650 people by the end of fiscal year 1981.
- The Navy may not meet congressionally directed policy of doing no more than 70 percent of shipwork in-house.
- Requires an increase in the personnel ceiling at Philadelphia.

Based on historical information, Philadelphia may have difficulty in hiring the required skilled workers and there may not be sufficient time to recruit and train unskilled workers to perform the work on the first ship. It appears that generally similar problems would not exist at Newport News for the first ship, but could exist for the follow-on ships if a new aircraft carrier is constructed at Newport News.

Newport News is currently constructing an aircraft carrier for the Navy and if additional work is not obtained, many workers would be subject to lay offs as the work on the carrier is completed. Many of these skilled workers could be used to perform the work on the U.S.S. Saratoga. The Navy plans to modify its ship overhaul schedule to support the increased employment during the buildup at Philadelphia and to provide training for the new people.

GAO found that the cost differences were greater than the Navy estimated and that Newport News may be able to perform the work on the follow-on ships in series by using the facilities currently used for commercial work

On June 22, 1978, Newport News told the Navy that it had the facilities required to overhaul the four ships in series under the Navy schedules without conflicting with other Navy programs. The Newport News' proposal involved using facilities in the south yard for the lead ship and facilities in the north yard, now being used for commercial work, for the follow-on ships. It estimated that minor modifications costing about \$2.5 million in 1978 dollars would be required and that a lead time of 3 to 6 months would be sufficient to make the facility modifications. Newport News probably would not need to use the north yard facilities for the follow-on ships if a new aircraft carrier is not constructed at this site.

GAO found that the Navy's evaluation of Newport News' facilities was limited primarily to the facilities in the south yard which are currently used for Navy work and that the Navy did not know whether the service life extension program could be done in the north yard. This issue requires further evaluation. The Navy requested from Newport News some additional information concerning the facilities' capability. This information was furnished to the Navy on August 28, 1978, and the Navy is evaluating it.

RECOMMENDATION

In view of the large cost differences between the two sites and the new information which indicates that Newport News may be able to perform the follow-on service life extension programs, a revalidation of the site selection decision is appropriate. Consequently, GAO recommends that the Secretary of the Navy re-evaluate the decision to do the service life extension program work on the U.S.S. Saratoga at the Philadelphia Naval Shipyard and determine whether the decision can still be justified.

AGENCY COMMENTS

As requested, GAO did not follow its usual procedure of obtaining written comments on this report from agency officials. However, GAO discussed the matters covered in the report with Navy officials and their comments are incorporated where appropriate.

C o n t e n t s

		<u>Page</u>
DIGEST		i
CHAPTER		
1	INTRODUCTION	1
	Scope of review	1
2	EVALUATION OF NAVY COST ESTIMATES	3
	Our adjustments	3
	Basic shipbuilder conversion costs	6
	Projected escalation	10
	Reserve for program growth	10
	Government-furnished material costs	11
	Military personnel costs	11
	Corporate taxes lost	12
	Contract administration costs	12
	Other costs	12
	Retirement costs	13
	Conclusion	13
3	OTHER FACTORS	14
	Additional factors need to be considered	15
	Lack of skilled workers	16
	Government policy of relying on private industry	17
	Productivity considerations	18
	Use of the ship's crew	18
	Shipyard modernization program	21
	Conclusion	21
	Recommendation	22
APPENDIX		
I	Alphabetical listing of requesters	23

CHAPTER 1

INTRODUCTION

On April 14, 1978, Vice President Mondale announced that the Department of the Navy planned to send the aircraft carrier U.S.S. Saratoga to the Philadelphia Naval Shipyard for the service life extension program. The purpose of the program is to extend the carrier's current service life of 30 years to 45 years.

The U.S.S. Saratoga was originally commissioned in 1956 and will be 24 years old when the program begins. The program is now scheduled to be done over the 28-month period between October 1, 1980, and February 1, 1983.

In addition to the U.S.S. Saratoga, the Navy plans to extend the service life of the three additional Forrestal Class aircraft carriers. The current schedule for the four aircraft carriers is shown below.

<u>Aircraft carrier</u>	<u>Start</u>	<u>Complete</u>
U.S.S. Saratoga	Oct. 1, 1980	Feb. 1, 1983
U.S.S. Forrestal	Jan. 1, 1983	May 1, 1985
U.S.S. Independence	Apr. 1, 1985	Aug. 1, 1987
U.S.S. Ranger	July 1, 1987	Nov. 1, 1989

On June 7, 1978, the Navy issued a cost study comparing the estimated costs to do the service life extension program work on the U.S.S. Saratoga at (1) the Philadelphia Naval Shipyard and (2) the Newport News Shipbuilding and Dry Dock Company. Because the Office of Management and Budget guidance for fiscal year 1979 and subsequent years assumes that wage board reform will be approved by the Congress in fiscal year 1979, but its passage is uncertain, the Navy prepared two estimates for Philadelphia--one with wage board reform and the other without wage board reform.

SCOPE OF REVIEW

We made a limited review of the Navy's cost study primarily to determine the Navy's methodology and its reasonableness. We used the Office of Management and Budget guidance in Circular A-76 as a guide. As requested, we

did not make an extensive validation of the cost factors the Navy used because of time limitations and because they are based on preliminary information concerning the work package. Thus, actual costs for the service life extension program could vary considerably from the Navy's estimates. We did, however, determine the primary reasons for the cost differences between the two locations and adjusted the Navy's estimates to insure consistency and to correct some errors.

Because the Navy considered other factors in making its decision, we identified and evaluated, to the extent possible, these factors.

We made our review at:

- Headquarters, Department of the Navy,
Washington, D.C.
- Naval Sea Systems Command, Arlington, Virginia.
- Newport News Shipbuilding and Dry Dock Company,
Newport News, Virginia.

CHAPTER 2

EVALUATION OF NAVY COST ESTIMATES

The Navy's June 1978 cost study contained the following estimates for doing the service life extension program work package on the U.S.S. Saratoga at either the Philadelphia Naval Shipyard or the Newport News private shipyard.

- \$569 million at Philadelphia assuming that the method used to compute wages of blue collar Federal employees would not change.
- \$554 million at Philadelphia assuming that the Congress passes the proposed wage board reform bill which would lower future pay raises for blue collar workers.
- \$539.1 million at Newport News Shipbuilding and Dry Dock Company.

The Navy's cost estimates are rough estimates based on unknown factors. They were prepared primarily to compare the costs to do the work in-house at the Navy's Philadelphia shipyard versus on contract at the Newport News private shipyard. The Navy plans to refine the estimates and to have a final work package by February 1980, as the size and complexity of the work package is more clearly defined.

We reviewed the Navy's cost study and supporting documentation and adjusted the Navy's estimates to the extent appropriate. Our adjusted figures showed that the Navy understated the estimated costs at Philadelphia and overstated the estimated costs at Newport News.

OUR ADJUSTMENTS

Our review disclosed the following differences in assumptions, inconsistencies, and errors in the Navy study.

- Assuming (1) a ship's crew of 1,474 military personnel at Philadelphia and 300 military personnel at Newport News and (2) the crew does 395,000 labor days of work at Philadelphia and none at Newport News.
- Using projected bid rates for Newport News to estimate labor and overhead costs when actual rates were available and using them for the projections would have provided a better indication of the future rates.

--Including profit on shipyard material at Philadelphia and double profit at Newport News.

--Estimating contract modification costs at Newport News and Philadelphia using the Newport News basic construction price 1/ and by applying a factor used to estimate changes to contracts for follow-on ships although the ship was a lead ship.

--Estimating military personnel costs in discounted 1977 dollars and all other costs at the anticipated future price levels.

Because of these and other differences, the cost estimates appeared to be much closer than they would have been under similar assumptions for each location. The Navy's estimates, our adjustments, and the revised estimates are shown in the table on the next page.

The cost estimates shown for Newport News are based on doing the work in its south yard. Newport News has proposed using the newer north yard facilities for the follow-on ships because the south yard facilities will probably be required to construct a planned new aircraft carrier. Defense Contract Audit Agency resident auditors at Newport News said that the overhead rates in the north yard are higher than in the south yard primarily because of newer facilities. Consequently, the costs would probably be higher if the newer north yard facilities were used for the follow-on ships.

The primary reason for the difference in the cost estimates shown for Philadelphia is that the Navy estimated that with wage board reform the percent increase in wage board pay would be 3.4 percent for fiscal years 1979 and 1980 and 6.0 percent for each year thereafter; the annual percent increase in wage board pay was estimated at 6.2 percent for each year assuming no wage board reform.

1/The basic construction price consists of the estimated costs for labor, material, and overhead expressed in dollars for the base month.

<u>Location</u>	<u>Cost element</u>	<u>Amount included in Navy study (note a)</u>	<u>GAO adjustment</u>	<u>Revised estimate (note b)</u>
----- (millions) -----				
Philadelphia with wage board reform	Basic shipbuilder conversion and contract modifi- cation allowance	\$363.0	\$ 1.0	\$364.0
	Projected escalation	30.8	-0.6	30.2
	Reserve for program growth	4.2	-4.2	-
	Government-furnished material, services, and test	67.0	-	67.0
	Military personnel	69.7	15.9	85.6
	Corporate taxes lost	<u>19.3</u>	<u>-5.1</u>	<u>14.2</u>
	Total	<u>\$554.0</u>	<u>\$ 7.0</u>	<u>\$561.0</u>
Philadelphia with- out wage board reform	Basic shipbuilder conversion and contract modifi- cation allowance	\$376.6	\$ 2.6	\$379.2
	Projected escalation	31.9	-0.6	31.3
	Reserve for program growth	4.5	-4.5	-
	Government-furnished material, services, and test	67.0	-	67.0
	Military personnel	69.7	15.9	85.6
	Corporate taxes lost	<u>19.3</u>	<u>-5.1</u>	<u>14.2</u>
	Total	<u>\$569.0</u>	<u>\$ 8.1</u>	<u>\$577.3</u>
Newport News	Basic shipbuilder conversion and contract modifi- cation allowance	\$374.0	\$-95.9	\$278.1
	Projected escalation	51.6	-13.6	38.0
	Reserve for program growth	3.4	-3.4	-
	Government-furnished material, services, and test	67.0	-	67.0
	Military personnel	39.7	45.9	85.6
	Contract administration	<u>3.4</u>	<u>-</u>	<u>3.4</u>
	Total	<u>\$539.1</u>	<u>\$-67.0</u>	<u>\$472.1</u>

a/Assumes (1) a ship's crew of 1,474 military personnel at Philadelphia and 300 military personnel at Newport News and (2) the crew does 395,000 labor days of work at Philadelphia and none at Newport News.

b/Assumes a ship's crew of 1,474 military personnel at both locations.

The Navy has labeled certain information as business sensitive proprietary information; public release of the proprietary information may be prohibited by section 1905 of title 18, the United States Code. Consequently, we have excluded the following details from this report.

- The estimated total labor hours projected for the service life extension program.
- The estimated total shipbuilder material cost projected for the program.
- The projected labor, overhead, and premium overtime rates for Newport News.
- The allowances for contract modifications and profit.

The primary reasons for our adjustments are contained in the following sections.

Basic shipbuilder conversion costs

The basic shipbuilder conversion costs shown in the table represent the total estimated costs for shipbuilder labor, overhead, material, and basic change orders expressed in dollars for the base month period. For Newport News, the amounts also include profit.

Estimated labor and overhead rates

We reduced the Newport News labor and overhead costs by \$86.6 million because we (1) used February 1980 labor and overhead rates rather than March 1980 rates, (2) used labor rate projections based on historical information from Newport News rather than projections based on bids, and (3) considered the use of the ship's crew to do part of the work.

The Navy established February 1980 as the base month for Newport News and October 1980 as the base month for Philadelphia. Consequently, the basic shipbuilder conversion costs for Newport News should have been expressed in February 1980 costs. The Navy used projected March 1980 rates in estimating the Newport News labor and overhead costs and later applied an escalation factor to these costs as if they were February 1980 rates. We adjusted the Navy's estimate by using the February 1980 rates.

We also adjusted the labor and overhead rates for Newport News by using projections of the actual rates at Newport News. The Navy's projections of these rates were based on 13 bids which Newport News had submitted between March 1968 and May 1975 for Navy ship construction work.

Newport News won the contract on 6 of the 13 bids. The Navy established a correlation between the Newport News bid rates and the Bureau of Labor Statistics' composite labor rates for 16 different shipyards. The future rates for Newport News were then forecasted using the Bureau's indicators.

Actual monthly labor and overhead rates for Navy ship construction and for overhauls and refuelings at Newport News were available for each month from January 1975 through December 1977. We compared these 36 monthly rates with the Navy's projected rates and found that the actual rates were lower and averaged about 85 to 90 percent of the Navy's projected rates.

We asked Navy representatives why they used the Bureau's indicators for the shipbuilding industry to make the projections, rather than the Newport News actual rates. They said that the Navy technique is used for budget estimates and that it insures that adequate funds are requested in the budget.

We agree that for budget purposes when a specific shipyard may not have been identified for the work, it may be reasonable to estimate future labor and overhead rates using composite rates for the industry. However, in this case, (1) Newport News was identified, (2) the Navy said a cost plus incentive fee type contract would be used, and (3) actual labor and overhead rates for Newport News were available for making projections. Therefore, we believe that projections of actual Newport News rates should have been used.

We forecasted the February 1980 labor rates using Newport News' actual labor rates for (1) ship construction and (2) ship overhauls and refueling. Both of the forecasted rates were lower than the Navy's projected rates. Using the average for the two rates, we adjusted the Navy's cost estimates because the labor rates for the program would probably fall between the two rates. The planned work would probably require more days than overhauls, but less days than ship constructions. We accepted the Navy's estimate of the overhead rate for Newport News because Defense Contract Audit Agency representatives at Newport News believed that the projected rate was reasonable.

Our final adjustment to the Newport News labor and overhead costs was to consider the use of the ship's crew to do 395,000 labor days of the work package. The Navy determined that use of the ship's crew was required at Philadelphia because Philadelphia could not complete the total work package within the specified 28-month period without help from the crew. Because Newport News could

complete the work package within 28 months without help from the ship's crew, the Navy did not consider this alternative in its estimates.

In the past we recommended (see p. 19), and we still do, that the Navy should not use the ship's crew to do work during extensive overhauls. However, we adjusted the Navy's cost estimates to consider the use of the same ship's crew at Newport News because if its use is required at Philadelphia and it is an acceptable alternative then it could also be an alternative at Newport News.

We did not adjust the Philadelphia estimates to show the cost estimates without the ship's crew because of the Navy's determination that the shipyard could not meet the schedule constraints under that alternative. However, we did estimate the revised costs at Newport News without the ship's crew because we believe that as a general rule the crew should not be used. Our adjusted estimate was \$515.1 million if the crew is not used.

Estimated shipbuilder material costs

The Navy estimated the cost for the shipbuilder material at Newport News in estimated March 1980 costs and at Philadelphia in estimated October 1980 costs because it used different base periods for the two locations. The earlier period was used for Newport News to allow time for proposal preparation, the Navy to review the proposal, and negotiations leading to a signed contract for the work to be done.

Our review of the Navy's supporting documentation for the shipbuilder material cost estimates disclosed that the Navy estimated the basic material costs for 60 percent of the ship alteration and repair package and used this amount as a basis to estimate the material for the rest of the package.

We could not determine the reasonableness of the Navy's basic material cost estimate for the defined shipyard work package because the document supporting the estimate was an advance planning document and was not made available to us. We did, however, review the method the Navy used to estimate the other material costs. We found that the Navy's estimate was overstated by \$11.2 million at Newport News and \$10 million at Philadelphia because (1) it included profit at Philadelphia, although Navy shipyards would not

receive a profit, and double profit at Newport News and (2) it included some mathematical errors.

In addition, the amount included for the ship's crew work package may be overstated because it was based on the Navy's estimate of the material required for the shipyard work package.

The work to be done by the shipyard is major overhaul and repair work on items such as the hull structure, propulsion plant, and electrical systems, and most likely the material required for this work would be different than material required for the minor industrial and support work to be done by the ship's crew. The Navy, however, applied the estimated average material cost for the shipyard work to the ship's crew work package.

Estimated contract modification costs

The Naval Sea Systems Command's budgeting policy for estimating contract modification costs specifies a 4 percent larger factor to be applied to the estimated basic construction price for estimating changes to lead ships than for follow-on ships. Our review disclosed that although the U.S.S. Saratoga will be the lead ship, the Navy used the lower factor for follow-on ships because of the low technical risk associated with the program. In addition, the Navy included, using the Newport News basic construction price, the same amount for the estimated contract modification costs at both Philadelphia and Newport News.

We revised the estimates in accordance with Navy criteria for contract modification costs using the higher lead ship factor and applying it to the revised estimated basic construction prices for each location. This adjustment resulted in the contract modification estimate increasing by (1) \$11 million at Philadelphia with wage board reform, (2) \$12.6 million at Philadelphia without wage board reform, and (3) \$1.9 million at Newport News.

In August 1978 Navy representatives said that they believed the lower factor should have been used. They said there is no known historical information which would support using either factor to estimate changes for the type of work planned during the service life extension program and that it is a matter of judgment as to which factor should be used.

In view of the Navy's position, we also computed the costs using the 4 percent lower factor for estimating contract modifications and the estimated costs at each location decreased as follows.

	<u>Amount of reduction</u> (millions)
Philadelphia with reform	\$13.4
Philadelphia without reform	13.9
Newport News	9.9

Our revised estimates are based on using the higher factor because the Navy budget guidance states that the standard factors for lead and follow-on ships should be used unless there is historical program data that would justify a variance and no such data existed.

Projected escalation

We reduced the Navy's estimates for projected escalation because of our adjustments discussed in the earlier sections. As a result of these adjustments, the estimates were reduced by \$0.6 million at Philadelphia, with and without wage board reform, and by \$13.6 million at Newport News.

Reserve for program growth

The Navy study included the following amounts as a reserve for program growth.

	<u>Amount</u> (millions)
Philadelphia with reform	\$4.2
Philadelphia without reform	4.5
Newport News	3.4

Our review of the supporting documentation disclosed that the amounts were included as a reserve because earlier estimates of the cost for the service life extension program were higher than the latest estimates. Rather than revising the many cost and budget exhibits to show the estimated lower costs, the Navy decided to include the amounts as a reserve for growth in the program.

We do not object to including an allowance for growth. However, we believe the Navy's rationale for including the specific amounts is not sound; therefore, they were excluded from the estimates. In addition, we noted that the Navy's other cost elements already included a reserve for program growth.

Government-furnished material costs

We did not review the Navy's estimates of \$67 million for Government-furnished material because the amounts were the same at both locations and, therefore, would not affect the site selection decision.

Military personnel costs

The Navy estimated that the military personnel costs at Philadelphia and Newport News were \$69.7 million and \$39.7 million, respectively. We reviewed the supporting documentation and found that the estimates were computed using the Navy's discounted fiscal year 1977 billet cost tables which included costs such as base pay and allowances, medical costs, messing subsistence, retirement, and severance costs. Expressing military personnel costs in discounted 1977 dollars and all other costs at future price levels is an inconsistency. Consequently, we escalated the estimated military personnel costs to future year dollars. To do this, we used an annual rate of 6 percent which Navy representatives said was an appropriate rate.

In addition to increasing the costs so that they would be comparable to other costs in the study, we also increased the military personnel costs at Newport News to consider the use of the ship's crew to do the same 395,000 labor days of work as assumed at Philadelphia.

The net effect of our adjustment was that the estimated military personnel costs increased by \$15.9 million at Philadelphia and by \$45.9 million at Newport News.

We discussed our adjustment with Navy representatives who agreed that the costs should have been escalated. On September 5, 1978, a Navy representative said that the Navy recomputed, using fiscal year 1978 billet cost tables and an updated listing of assignments for the ship's crew, the military personnel costs and that the Navy's latest estimate was \$82 million. Because this was a recent recomputation, we were unable to review it.

Corporate taxes lost

The Navy included \$19.3 million in Philadelphia's cost estimates as the estimated Federal taxes lost to the Government by having the work done in-house rather than by private industry. We applied the Navy's methodology for estimating the corporate taxes lost to the revised cost estimates for Newport News. Because the revised estimates were lower, the net effect on the corporate taxes lost was a \$5.1 million reduction.

Contract administration costs

The Navy included \$3.4 million in the cost estimate for Newport News for the estimated increase in contract administration costs. We did not find any reason to question this estimate.

OTHER COSTS

The Navy's study should have included other costs such as

- costs to modify the existing facilities and equipment and to acquire new equipment required for the program,
- costs to hire and train personnel to do the work,
- cost to relocate and support military personnel and their families, and
- State and local taxes forgone. 1/

Because of the lack of time we did not estimate the above additional costs. However, we noted that a May 1977 Navy study estimated that additional plant equipment costing \$5.7 million would be needed at Philadelphia to support the program. In August 1978 Navy representatives said that they were still evaluating the facility and equipment needs at Philadelphia for the program.

1/Loss of income, sales, and other tax revenues to State and local governments are considered cost of the in-house alternative on the rationale that other Federal support may be required to compensate the State and local governments for the lost tax revenues.

Retirement costs

The Navy's cost estimates and our revised estimates shown for the Philadelphia Naval Shipyard are based on the Office of Management and Budget's Civil Service retirement cost factor of 14.1 percent. In our report to the Congress on the Federal retirement systems (FPCD-77-48, Aug. 3, 1977), we expressed concern over the unrecognized costs of these systems. We reported that a lack of full recognition of the cost of currently accruing retirement benefits caused the cost of Government programs to be understated.

The Office of Management and Budget has estimated that the Government's portion of the cost of retirement systems is 20.4 percent of pay. The estimated costs at Philadelphia would increase by about \$14 million if the 20.4-percent factor is used rather than the 14.1-percent factor currently specified.

CONCLUSION

The Navy cost study contained different assumptions, inconsistencies, and errors which resulted in an understatement of costs at Philadelphia and an overstatement of costs at Newport News. In addition, other costs should have been considered at both locations. The revised comparative costs showed lower costs of \$88.9 million to \$105.2 million at Newport News. This difference is much greater than the Navy's estimate.

CHAPTER 3

OTHER FACTORS

The estimated cost to perform the service life extension program at either Philadelphia or Newport News was only one factor which the Navy considered in reaching its decision to have the work done at Philadelphia. According to the Navy, the following three additional factors were important in reaching the decision.

- There are learning advantages for both the production work force and shipyard management by having the overhauls done in series at one shipyard.
- The Philadelphia Naval Shipyard is the secondary aircraft carrier shipyard facility on the east coast and it meets all the basic criteria required for accomplishing the aircraft carrier service life extension program.
- Construction of a new aircraft carrier at Newport News would preclude that yard from accomplishing the follow-on service life extension programs because of an interference problem caused by the size of available drydocks.

We agree with the Navy that there are learning advantages to having the same shipyard perform the service life extension program on all four aircraft carriers. We also agree that if the cost differences are minor and unlike Philadelphia, Newport News could not accomplish all four ships in series, then this could be an important factor. However, we found that the cost differences were much greater than the Navy estimated (see ch. 2), and Newport News may be able to do the work on all four ships in series by using the facilities currently being used for commercial work. The Navy's analysis of the facilities at Newport News was limited primarily to the facilities in the south yard which are currently used for Navy work. The Navy concluded that there would be an interference problem between the use of these facilities for this program and other Navy work. However, Newport News may be able to use other facilities.

Newport News told the Navy on June 22, 1978, that it had the facilities required to accomplish the four service life extension programs in series under the Navy schedule without conflicting with other Navy programs. Newport News

said that it was willing to commit the necessary facilities in the south and north yards for the work on the four ships provided that it received a similar commitment from the Navy.

On July 14, 1978, Newport News completed a study identifying various facility modifications required for it to handle the service life extension programs in series and reported to us that the modifications would cost about \$2.5 million in 1978 dollars. Newport News said that a lead time of 3 to 6 months would be adequate for the facility modifications.

This issue requires further evaluation, and Navy representatives said that the Navy has requested some additional information concerning the facilities' capability from Newport News. On August 28, 1978, the Navy received this information, and the Navy is evaluating it.

ADDITIONAL FACTORS NEEDED
TO BE CONSIDERED

We reviewed the documentation supporting the Navy's decision to have the work done at Philadelphia and found that the Navy considered two alternatives--sending the first ship to Newport News and follow-on ships to Philadelphia and sending all four ships to Philadelphia.

The Navy identified the following advantages for the first alternative.

- Utilizes available carrier capability at Newport News during fiscal years 1980-82.
- Provides an orderly and steady buildup of the personnel required at Philadelphia to do the work.
- Provides increased workload for Philadelphia during the buildup.

The Navy identified only one advantage for the second alternative which was that the workload for Philadelphia would increase. However, the following disadvantages were identified by the Navy.

- Short training lead time at Philadelphia to develop aircraft carrier expertise.

- Requires the use of the ship's crew to do part of the work.
- Requires rapid buildup in Philadelphia from the December 1977 level of 7,700 to 9,650 people by the end of fiscal year 1981.
- The Navy may not meet congressionally directed policy of doing no more than 70 percent of shipwork in-house.
- Requires an increase in the personnel ceiling at Philadelphia.

Our evaluation of the key issues is presented in the following sections.

Lack of skilled workers

The Navy estimates that Philadelphia will need to hire about 1,700 more people between August 1978 and fiscal year 1981 to have the required skill mix for doing the aircraft carrier service life extension program. Based on historical information, Philadelphia may have difficulty in hiring the required skilled workers, and there may not be enough time to recruit and train unskilled workers to do the work on the first ship.

It appears that similar problems would not exist at Newport News, at least for the first aircraft carrier in the program. Newport News is currently constructing an aircraft carrier for the Navy. According to Newport News and the Navy, many of the skilled workers could be used to do the work on the U.S.S. Saratoga.

However, Newport News projects that future employment levels, based on current Navy and commercial work and anticipated future work, will decrease greatly between now and 1982, and will increase during 1983 and 1984 if both the construction of a new aircraft carrier and the work on the second aircraft carrier in the service life extension program is done there.

The Navy's May 16, 1978, annual report on the status of the U.S. shipbuilding and ship repair industry in 1977 stated that historically, neither local markets nor recruitments have provided the public and private shipyards with sufficient numbers of skilled workers. Therefore,

the shipbuilders must rely on on-the-job and formal training programs to acquire skilled workers. This report also stated:

"Rapid workforce expansions generally result in losses of productivity and increased turnover due to the influx of new and unskilled workers. Heavy layoffs, especially of extended duration, result in the permanent loss of skilled shipbuilding workers to competing industries."

The Navy plans to modify its ship overhaul schedule beginning in fiscal year 1979 by placing additional ships in Philadelphia for overhaul to support the increased employment and to provide training required for the program. According to the Navy, some of the additional work probably would have gone to the private sector. A Navy representative said that the scheduling changes would be made during October or November 1978 and that the changes would include (1) increasing the workload at Philadelphia and (2) adjusting the schedule at other public and private shipyards to insure that private industry does about 30 percent of the shipwork.

In August 1978, Navy representatives said that the Philadelphia Naval Shipyard was already overloaded. On May 17, 1978, the Navy increased the employment ceiling at the shipyard from 7,715 to 7,970 people. The Navy said that the shipyard's current workload justifies a total employment of 8,400 and unless the personnel ceiling is increased further, the shipyard would remain in a very serious overload condition at least through mid 1979.

Government policy of relying on private industry

The Government's general policy is to rely on private enterprise to supply its needs for commercially and industrially available products and services.

In 1974 the Congress mandated that as a minimum 30 percent of ship conversion, alteration, and repair money should be spent in private yards. The Navy has followed this congressional mandate closely. Over the last 5 years, about 32 percent of ship conversion, repair, and alteration money was spent in private shipyards. However, because of the large dollar amounts involved with the service life extension program, some adjustments to the workload schedules

at other public and private shipyards may be required to obtain a similar split in the future.

Productivity considerations

The Navy's study assumed that Philadelphia and Newport News would use the same number of direct labor days to perform the service life extension program. Newport News officials questioned this assumption for the following two reasons.

- Newport News is currently building an aircraft carrier for the Navy; and, therefore, has expertise which Philadelphia does not have.
- Philadelphia must build up its work force quickly and use many unskilled workers to perform the work which will lower the shipyard's productivity.

We discussed the assumption with Navy representatives and reviewed the Navy's documentation supporting the assumption. We found that the Navy was aware of the issues cited by Newport News and that by assuming the same number of labor days at both locations, the Navy is in effect assuming that Newport News can do the work in fewer days than Philadelphia. This is because Newport News charges functions such as first-line supervision, planning and production control, and ship planning as direct labor days while Philadelphia and the other Navy shipyards charge these functions to overhead.

According to the Navy, the first-line supervision alone accounts for 12 or 13 percent of the direct labor days for production on typical Navy work at Newport News. Consequently, assuming the same number of total direct labor days recognizes some differences in productivity at the two locations. The Navy said that it does not have any precise means to quantify the productivity difference and believes that its method of offsetting productivity against the added direct functions is a reasonable assumption.

Use of the ship's crew

As discussed in chapter 2, the Navy's plan is to use the ship's crew to perform part of the work package at Philadelphia, but if the program is done at Newport News the ship's crew would not be used. The Navy plans to have a ship's crew (63 officers and 1,411 enlisted personnel)

remain on board the ship at Philadelphia, of which 1,174 enlisted personnel would do the work. The remaining 300 would provide continuity, serve as an interface between the ship and shipyard, and act as a focal point for remanning the ship. The Navy plans to leave these 300 officers and enlisted personnel on board the ship at Newport News for the same reasons as at Philadelphia.

The use of crews during lengthy overhauls to perform part of the work package is inconsistent with our position in a previous report to the Secretary of Defense. ^{1/} In this report we concluded that the use of these highly trained personnel to do industrial tasks, administrative, and support functions represents a waste of training and experience that is needed on operational ships and elsewhere in the Navy. We recommended that the Secretary of Defense direct the Navy to:

- (1) Reduce and maintain ships' crews during overhauls at the minimum essential level necessary for assuring safety of the ship and equipment.
- (2) Reassign other crew members to positions where their skills are needed to fill high priority vacancies that exist in the operational fleet and elsewhere and where their skills and training can be used to greater advantage.

The Navy's estimates of the military personnel costs were much less than the projected civilian labor rates at Philadelphia and Newport News. Consequently, assuming the ship's crew would perform part of the work package results in lower costs. In addition, the Navy's estimates for changes and projected escalation were based on the estimated costs for the work done by the shipbuilder and no allowance was included for changes to the ship's crew package. Because of these differences, the Navy's decision to use a ship's crew at Philadelphia and none at Newport News distorted the cost comparison.

We discussed the possible use of a ship's crew with Newport News representatives who said that the Navy has used a ship's crew there in the past and that the Navy could use the crew for the work on the U.S.S. Saratoga.

^{1/}"Changes In Navy Ship Overhaul Practices Could Improve Fleet Capability and Crew Effectiveness" (FPCD-77-76, Apr. 8, 1977).

However, Newport News said that it would not want to use the crew to the extent planned at Philadelphia. Instead of using the crew for 395,000 labor days, Newport News proposed that the crew would do 295,000 labor days and it would do the remainder. This is summarized in the following table.

	<u>Industrial labor days</u>	<u>Support labor days</u>	<u>al</u>
Navy plan at Philadelphia	150,000	245,000	395,000
Newport News proposal	<u>150,000</u>	<u>145,000</u>	<u>295,000</u>
Difference	0	100,000	100,000

The Navy's decision to use a ship's crew at Philadelphia to perform part of the work package was based upon the Navy's conclusion that Philadelphia could not complete the estimated total work package within the specified 28-month period unless its capability was augmented by the ship's crew. The Navy estimated that it would take at least 5 more months to complete the work if the ship's crew was not available.

In recommending use of the ship's crew to meet the 28-month schedule, the Naval Sea Systems Command stated:

"Philadelphia is limited to a sustained productive effort of 33,000 Total Direct Labor Mandays (TDLMD) per month. This figure has been determined to be a realistic and achievable estimating factor for planning durations of carrier availabilities."

We noted that the shipyard work package has increased by a total of 105,000 direct labor days since the decision was made to use the crew. Navy representatives told us that the increase could be accommodated. They said that the limitation did not apply to the large amount of design and engineering work included in the program and that Philadelphia plans to subcontract some of the work to private contractors and other Navy activities. This will permit Philadelphia to concentrate its work force on the work which must be, or is best, done at the shipyard.

The Navy gave us its estimates of the shipyard's monthly direct labor usage during the program. Although

the Navy has determined that aircraft carrier operational commitments in support of a national policy cannot be met if the program duration exceeds 28 months, the usage was based on 29 months. It ranged from a low of 8,830 direct labor days to a high of 66,276 direct labor days. More significant was that it exceeded 33,000 for each of the 16 months of June 1981 through September 1982. Therefore, a lot of work may have to be done by others.

Shipyard modernization program

The Navy has a long-range modernization program for its eight shipyards, including the Philadelphia Naval Shipyard. The modernization program for the Philadelphia shipyard was presented in a December 1974 study by the Naval Sea Systems Command, and in May 1975 the Navy estimated that facility improvements and equipment would cost \$141.6 million.

We made a cursory review of the study and found that the modernization plan assumed that the employment level would not increase above 7,300 people during the next 10-year period. In addition, the projected workload at the shipyard did not include any work on aircraft carriers.

Navy representatives said that the December 1974 study is the latest study and that it has not been updated to consider the impact of the aircraft carrier service life extension program. The decision to do the aircraft carrier work at Philadelphia could affect the modernization program because the equipment and facilities required for overhauling carriers could be different than those planned for in the modernization plan.

CONCLUSION

There are uncertainties as to whether Newport News can perform the follow-on service life extension programs. Also, additional factors need to be considered such as (1) the capability of hiring skilled shipbuilding workers at Philadelphia for the program, (2) productivity at public and private shipyards, (3) whether or not the ship's crew should be used at Newport News, and (4) the impact of the program on the planned modernization program at the Philadelphia Naval Shipyard.

RECOMMENDATION

In view of the large cost differences between the two sites and the new information which indicates that Newport News may be able to perform the follow-on service life extension programs, a revalidation of the site selection decision is appropriate. Consequently, we recommend that the Secretary of the Navy reevaluate the decision to do the service life extension program work on the U.S.S. Saratoga at the Philadelphia Naval Shipyard and determine whether the decision can still be justified.

ALPHABETICAL LISTING OF REQUESTERS

The Honorable Robert E. Badham, House of Representatives
The Honorable Robin Beard, House of Representatives
The Honorable M. Caldwell Butler, House of Representatives
The Honorable Dan Daniel, House of Representatives
The Honorable Robert W. Daniel, Jr., House of Representatives
The Honorable William L. Dickinson, House of Representatives
The Honorable Jack Edwards, House of Representatives
The Honorable Joshua Eilberg, House of Representatives
The Honorable Bud Hillis, House of Representatives
The Honorable Marjorie Holt, House of Representatives
The Honorable Jack Kemp, House of Representatives
The Honorable Trent Lott, House of Representatives
The Honorable Larry P. McDonald, House of Representatives
The Honorable Donald J. Mitchell, House of Representatives
The Honorable G. V. Montgomery, House of Representatives
The Honorable Bill Nichols, House of Representatives
The Honorable J. Kenneth Robinson, House of Representatives
The Honorable David Satterfield, House of Representatives
The Honorable Floyd Spence, House of Representatives
The Honorable Dave Treen, House of Representatives
The Honorable Bill Wampler, House of Representatives
The Honorable G. William Whitehurst, House of Representatives
The Honorable Bob Wilson, House of Representatives
(947333)