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REPORT TO THE CONGRESS

B-163058

Outlook For Production On The Navy's LHA And DD-963 Shipbuilding Programs B-163058

Department of the Navy

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

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JULY 26, 1973

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

B-163058

The Honorable Carl Albert
Speaker of the House of Representatives

Dear Mr. Speaker:

This is our report on the outlook for production on the Navy's LHA and DD-963 shipbuilding programs. The more significant points of this report are summarized in the digest which is bound in the report.

We made our review pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

We are also sending this report today to the President of the Senate. Copies are being sent to the Director, Office of Management and Budget; the Secretary of Defense; and the Secretary of the Navy.

Sincerely yours,

Elmer B. Staats

Comptroller General
of the United States

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ABBREVIATIONS

APL	American President Lines
GAO	General Accounting Office
LHA	general-purpose amphibious assault ship

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

OUTLOOK FOR PRODUCTION ON THE NAVY'S LHA AND DD-963 SHIPBUILDING PROGRAMS

Department of the Navy B-163058

DIGEST

WHY THE REVIEW WAS MADE

GAO examined the status of two of the Navy's largest shipbuilding programs under contracts with Ingalls Shipbuilding division of Litton Systems, Inc., in Pascagoula, Mississippi, because of production and related difficulties at Litton's new automated shipyard. The two programs are for

--the general-purpose amphibious assault ship (LHA) designed to transport and land troops and essential combat equipment and supplies by embarked helicopters, amphibious craft, and vehicles and

--the DD-963 antisubmarine, gas-turbine-propelled destroyer, having additional capability of shore bombardment and escort of strike forces.

The LHA program is the first Navy shipbuilding program undertaken by Litton in the new automated yard. There has been concern that this program's management and production problems would adversely affect the follow-on DD-963 program.

FINDINGS AND CONCLUSIONS

Principal concerns are the unintended simultaneous construction of the LHAs and the destroyers and the adverse effect that slippage in the construction schedule of one program could have on the other. (See pp. 8 and 13.)

There is little doubt that Litton and the Navy substantially underestimated the problems involved, including

--starting a new facility,

--obtaining an adequate work force,

--designing ships 2,000 miles from the construction site by a completely new organization, and

--using aerospace production techniques.

No real precedent existed for measuring the potential difficulty of these problems. Rarely has a shipyard been designed and built, workers hired, and a force "turned up" under pressure to meet production schedules. (See p. 10.)

Organizational difficulties

Litton and the Navy disagree on who is primarily responsible for the problems. Weaknesses in Litton's organization and management undoubtedly have contributed to both cost growth and schedule slippage.

Since 1969 the west yard has had

--three presidents,

--five finance vice presidents,

--five operations vice presidents,

Tear Sheet. Upon removal, the report cover date should be noted hereon.

--six LHA program managers,

--two DD-963 program managers, and

--four directors of quality assurance. (See p. 10.)

On July 21, 1972, Litton's old east and new west shipyards at Pascagoula were merged. Most of the members of the management team which assumed direction of the merged yards were formerly responsible for the more conventional east yard. (See pp. 9 and 10.)

Contracting concepts

Unique contracting concepts contributed to the problems. For the first time the Navy delegated to the contractor almost complete responsibility for decisions on program execution and complete design responsibility. The effects of these concepts on the programs will not be known until all contractor claims are resolved. Both parties have made charges claiming actions or inactions. (See p. 17.)

Planning and control systems

Developing suitable systems for planning and controlling production has largely contributed to delays, out-of-sequence work, and failure to meet cost and time targets in the west yard.

When the two yards merged, the east yard planning and control system was extended to the west yard. Although the first LHA and the first two destroyers are being built under nearly conventional construction methods, the new system appears capable of functioning under modular construction methods. Until the system has actually operated, its success cannot be insured. (See p. 11.)

Labor force difficulties

Labor problems at the west yard have been greater than at other shipyards, primarily because of

--absenteeism;

--inability to attract and retain personnel in such critical skills as welding; and

--low labor force productivity, a serious matter.

Beginning with the merger of the yards, these problems began to come under control. One labor force, instead of two competitive forces, is now used. Litton decided not to seek new work for the east yard but to favor completion of the west yard workload. Litton management projected it would achieve its productivity goal by July 1973. (See p. 11.)

Cost and schedule status--LHA program

Contractor cost estimates for the LHAs are now more than the ceiling price allowed in the contract, and their delivery has been delayed 2 years or more. The first LHA is now scheduled for delivery in March 1975. (See pp. 18 and 25.)

The initial unit cost for the original nine-ship LHA program was projected at $153 million. By June 30, 1972, the Navy's unit cost estimate for a five-ship program had reached $194 million. The current Navy estimate is $228 million. (See p. 18.)

On March 31, 1972, the Navy and Litton began to negotiate to reset LHA program prices, recognizing the

cancellation of four ships, escalation estimate changes, and delays and changes in the contract. Negotiations were scheduled for completion by February 28, 1973. However, since the Navy and the contractor were not able to reach an agreement, a contracting officer's decision was issued unilaterally establishing the contract price.

On March 1, 1973, Litton announced that its Ingalls Shipbuilding division and the Navy were $108 million apart in negotiating a final fixed price to produce five LHAs. Litton said (1) the difference represents the cost of work and schedule delays caused by the Navy's actions, (2) the Navy's unilateral price is unreasonable and unrealistic, and (3) it intends to seek an equitable settlement. On March 2 Litton notified the Navy that it was appealing the contracting officer's decision to the Armed Services Board of Contract Appeals. On March 30 Litton asked the Board for a 90-day extension for filing the complaint. The complaint was submitted on July 5, 1973. (See p. 20.)

Cost and schedule status--DD-963 program

The cost and schedule of the DD-963 program have not significantly changed since June 1970, when the contract was awarded. Congressional reservations, however, were expressed in 1972 when the Congress declined to authorize the next block of 7 ships (beyond the 16 authorized) included in the fiscal year 1973 budget.

The stress in Litton generated by this situation tends to freeze the announced cost estimates for the 30-ship program and the delivery schedule. If variances arise, Litton is likely not to disclose them until after authorization or sometime in the future when the full program seems committed. (See p. 22.)

Observations on the future

Some cost growth and schedule slippage on the DD-963 program can be expected. However, construction is at such an early stage that clear judgment on achievement of cost and schedule goals is not possible.

Unfavorable factors are:

--Litton has had no experience with meaningful learning curves and productivity on the DD-963 program, because the first keel was not laid until November 1972.

--Major design changes or additional requirements, if not avoided, could cause cost and production schedules to be exceeded.

--Further LHA slippage undoubtedly would interfere with the DD-963 program.

--The tight DD-963 production schedule fails to allow for unanticipated problems which could create a bottleneck.

Favorable factors are:

--Improvements made in management, labor, and planning.

--The opportunity for learning-curve improvements that constructing 30 ships of the same design in 1 shipyard offers.

--The fact that the DD-963 is not stretching technology.

--The fact that the contractor already has developed, and the Navy has concurred in, a plan for concurrent production of the LHAs and the DD-963s in the west yard.

--The scheduled completion of merchant ships in the yard this year.

A major unresolved issue of the LHA program is the contractor's claim. Other than this, many of the same favorable and unfavorable factors in the DD-963 program apply to the LHA program.

To keep abreast of these factors, we believe that the Navy should continue to periodically review Litton's efforts through onsite production audits. These should continue at least until modular construction is achieved and meaningful experience is gathered on productivity and learning curves.

RECOMMENDATIONS OR SUGGESTIONS

This report contains no recommendations or suggestions.

AGENCY ACTIONS AND UNRESOLVED ISSUES

The material presented in this report was presented in a GAO staff study released in March 1973 for use in authorization and appropriation committee hearings. At that time we discussed our proposed report with Navy and contractor officials. They agreed with the facts presented and offered suggestions which have been incorporated as appropriate. Written comments were not obtained from either party.

MATTERS FOR CONSIDERATION BY THE CONGRESS

In fiscal year 1973 the Congress withheld procurement funds for destroyers 17 through 23 because of problems with the LHA program. As a result, in fiscal year 1974 the Congress must decide whether it will provide $387 million for these 7 ships and $198 million for long-leadtime equipment for the last 7 ships of the 30-ship program. Procurement funds for the last seven ships will be requested in the fiscal year 1975 budget. If funds are not provided and the last 14 destroyers are canceled, the terms of the contract would subject the Government to paying cancellation costs up to $279 million. In fiscal year 1974 the Congress also must decide whether to provide about $169 million in additional LHA program funds due to cost growth and revised escalation estimates.

CHAPTER 1

INTRODUCTION

As part of our continuing review of Department of Defense major acquisition programs, we examined aspects of the Navy's general-purpose amphibious assault ship (LHA) and DD-963 destroyer shipbuilding programs.

The LHA is designed to be capable of transporting and landing troops and their essential combat equipment and supplies in amphibious assault by means of embarked helicopters, amphibious craft, and vehicles. A multiyear, fixed-price-incentive, development-and-production contract for constructing nine LHAs was awarded to Litton Systems, Inc., of Litton Industries on May 1, 1969. In December 1970 the number of LHAs to be constructed was reduced to five.

DD-963 is the designation for a class of gas-turbine-propelled, antisubmarine destroyers with shore bombardment capability and sufficient speed for escorting strike forces. A multiyear, fixed-price-incentive, development-and-production contract for constructing 30 ships was awarded to Litton on June 23, 1970.

Most of the material in this report was presented in a GAO staff study released in limited number in March 1973. Prior GAO staff studies on the LHA program were issued in 1970, 1971, and 1972. Studies on the DD-963 program were issued in the same years. In addition, we prepared a report (B-170269, Aug. 26, 1970) dealing with the circumstances of the award of the DD-963 destroyer contract and plans to construct all 30 ships in a new and untested shipyard in response to a request of former Senator Margaret Chase Smith.

Extensive coverage of these two programs can also be found in the published hearings on military posture before the House Committee on Armed Services (H.R. 12604, Apr. 17 and 24, 1972). In December 1972 these programs were also discussed in hearings held by the Subcommittee on Priorities and Economy in Government, Joint Economic Committee.

Much controversy has developed over the awards of these contracts, particularly over the delivery delays and cost growth of the LHA program. Contractor cost estimates for the LHAs are now more than ceiling price, and their delivery

has been delayed 2 years or more. Litton and the Navy disagree on who is primarily responsible for the problems. Questions have been asked about the effect of LHA schedule and cost problems on the DD-963 program and about the shipyard's physical capability to handle both programs simultaneously.

SCOPE OF REVIEW

This report covers the cost and schedule estimates for the LHA and DD-963 programs, the special circumstances of startup in a new, modern shipyard, the adequacy of facilities, and organizing and staffing for management and production. We did not determine the need for these programs or become involved in current negotiations between the Navy and the contractor on the LHA contract.

We enlisted the aid of consultants in assessing the technical aspects of shipyard operations. The views expressed in this report, however, are entirely ours.

CHAPTER 2

LITTON SHIPYARD FACILITIES

Litton's Ingalls Shipbuilding division at Pascagoula, Mississippi, includes the old east yard and the new west yard. On July 21, 1972, these two yards were consolidated under one management. Labor, shops, and equipment are now interchangeably used, and all are available in support of the two major Navy programs. Efforts to bring new construction into the east yard have been suspended; it is expected to continue submarine and ship overhaul, but its special shops, outfitting docks, and skilled craftsmen are being applied to the DD-963 and LHA programs as required.

The west yard was built on a 600-acre peninsula at the mouth of the Pascagoula River. Construction of the yard began in January 1968, and the first ship construction operations began in March 1970. The yard, designed for series production of one-design ships, incorporates many advanced ideas. It is designed to encourage a logical flow of material from cutting and shaping to subassembly, to large modules, and then to final ship assembly. Material, subassemblies, and parts can be moved by truck to the module, and heavy-lift cranes can lift assemblies up to several hundred tons. Translation cars on tracks move modules into the integration area and, finally, whole ships onto the launch pontoon. The arrows on the schematic of the yard, pictured on page 9, show the flow of work.

Although particularly designed for quantity modular construction of one-design ships, the yard is flexible and should physically support the competitive construction of ships of any design. Exceptions to this might be outsized vessels, such as aircraft carriers, which exceed the dimensional capacity of the existing pontoon launch system and cranes.

The west yard contains some features which are unique in this country. The pontoon launch and retrieval system used by the yard is an excellent system. It offers more flexibility than a large building drydock, costs less, and permits the drydocking of ships during or after fitting out if this proves necessary.

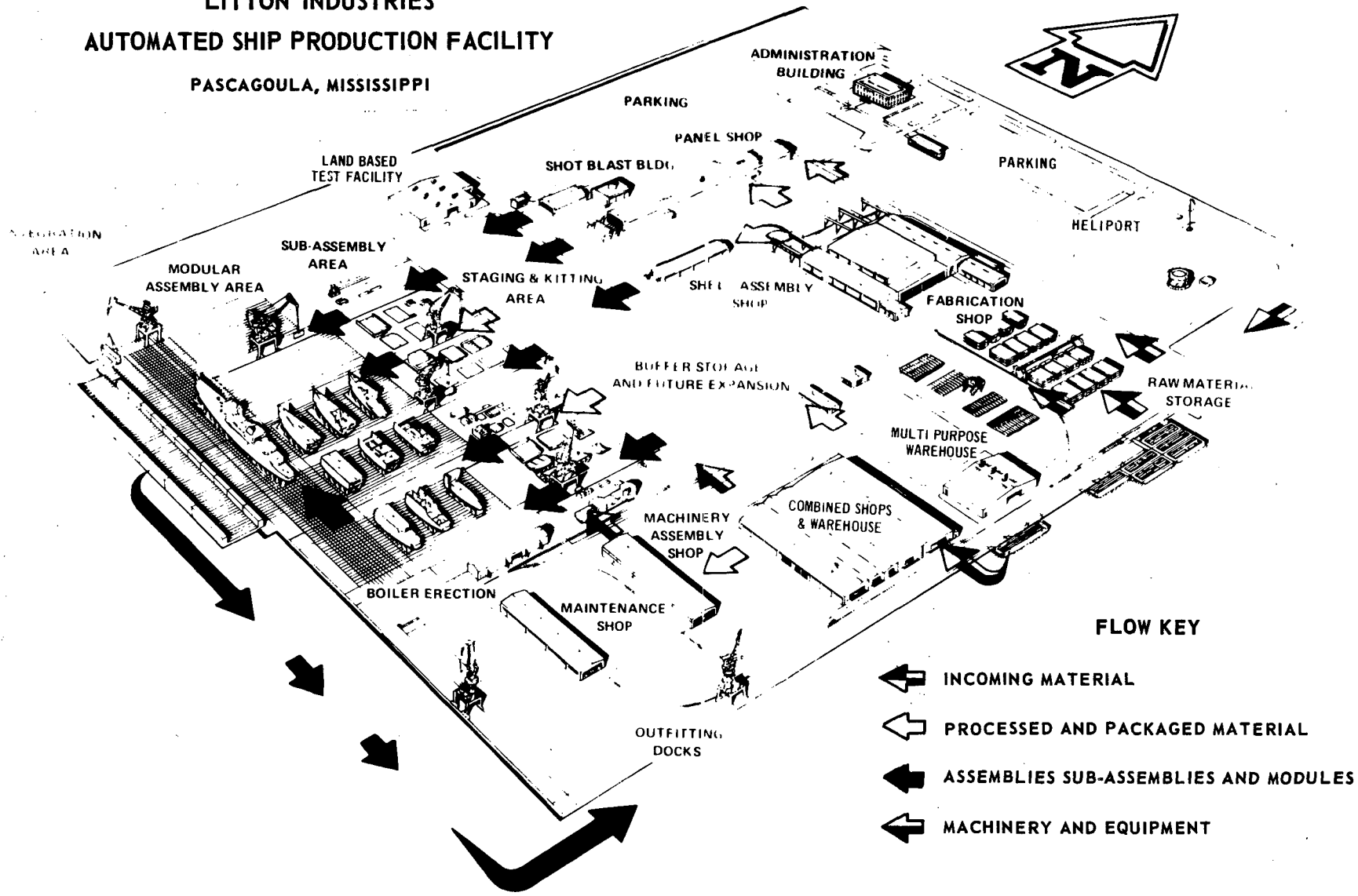
The land-based test facility for electronic equipment is a new kind of shipyard capability. Sets of complex electronic and computer systems are checked out with the associated software before they are installed on the ship. The use of metal pallets for installing electronic systems is a novel method of reducing some shipboard cabling and handling systems during installation. This facility is intended to save time and money in outfitting and checking out ships. It is also intended to permit the installation at the latest possible time, which may, in turn, reduce the hazards of damage and protect fragile operating equipment.

A principal concern of both Litton and the Navy is the unintended simultaneous construction of LHAs and DD-963s and the adverse effect that a slippage in the construction schedule of one program could have on the other program. The Navy has reviewed and concurred in Litton's plans for scheduling the erection of ship modules or sections and the movement of these modules from the bays to the ship integration areas and the launch area. Under Litton's erection plans the smaller and more quickly constructed destroyers may be moved around an LHA for launch. The Navy stated that these plans "provide sufficient confidence in the adequacy of Ingalls facilities to perform the DD-963 Class and LHA-1 Class shipbuilding activities."

It should be added, however, that the present management has elected to construct the first LHA and first two destroyers by adding pieces and subassemblies, smaller than the large ship modules as planned, to the keels in the final erection area. This means longer occupancy of these final positions before launch. Unless full modular construction is undertaken on subsequent ships, congestion can be expected, which will affect schedules. This critical pattern of construction should become visible in the next year.

LITTON INDUSTRIES
AUTOMATED SHIP PRODUCTION FACILITY

PASCAGOULA, MISSISSIPPI



CHAPTER 3

YARD MANAGEMENT

There is little doubt that the Ingalls Shipbuilding division and the Navy substantially underestimated the problems involved in (1) starting a new facility, (2) obtaining an adequate work force, (3) designing ships 2,000 miles from the construction site by a completely new design organization, and (4) using aerospace production techniques.

No real precedent existed for measuring the potential difficulty of these problems. Very rarely in peacetime has a shipyard been designed and built, workers hired, and a force "tuned up" under pressure to meet production schedules.

All of the above problems are reflected in the schedule delays, the cost overruns, and the numerous changes in management. For example, since the beginning of yard operation, there have been three presidents, five vice presidents for finance, five vice presidents for engineering, five vice presidents for operations, six LHA program managers, two DD-963 program managers, and four directors of quality assurance.

During the last year Litton has taken very aggressive action to bring in shipbuilding expertise and to stabilize top management. Within the next year the Government should know whether this stabilization has been achieved.

From the beginning of the west yard until July 1972, the west and east yards' operations were entirely separate.

1. Each yard had a complete management organization and competed for scarce manpower with the other yard.

2. The west yard organization basically consisted of aerospace managers, and the east yard consisted of shipbuilding personnel.

3. Each yard had its own management concept, reports, and recording systems.

The steps taken to consolidate management organizations and eliminate duplicative functions follow.

The first step was to strengthen the yard management by putting key men from the east yard in charge of the combined yards. This brought substantial shipbuilding experience into top yard management. Also, the LHA and DD-963 design organizations and project offices were moved from California to the construction site.

The second step was to develop and install a planning process that provides work planning data and the framework for accumulating and comparing data on work performance so that the status of programs could be better determined.

The planning process, roughly speaking, consists of breaking up the large ships' work drawings into segments which contain the elements of manageable work packages. These are segregated using predominantly one craft (pipefitters, welders, etc.) and adding detailed notations and sketches for pieces which guide the yard supervision and craftsmen. These are then scheduled in a buildup of the pieces, subassemblies, modules, and ship assembly and outfitting, which progress logically and on which labor is assigned in the most efficient way management can devise. Estimates of man-hours by craft and materials are applied to each package. Actual work is then tracked as to cost, completion date, materials, labor, etc.

The new management is installing on these ship programs the computer-aided planning system previously used in the east yard. It appears sophisticated, logical, and capable of functioning in west yard operations. We were told that this system should be installed by July 1973. In view of the complex work breakdown structure needed to build ships and the hundreds of thousands of information elements to be inserted, such a system will become able to accurately drive and synchronize yard work only by trial and adjustment.

The third step was to better manage the work force. Labor problems have been very distressing. Departures of skilled personnel have, on occasion, exceeded new hires, and the rate of turnover has been far higher than in other shipyards. Absenteeism has been a major problem. Compared with the east yard's productivity, the west yard's productivity at the time of merger was 42 percent.

Beginning with the merger of the two yards these problems began to come under control. Litton decided not to seek new work for the east yard but to favor the

accomplishment of the west yard workload. Further, only one labor force is now used. Management reports that the west yard's productivity has improved from 42 percent to 77 percent. Management projects that the 100-percent comparative level will be achieved by July 1973 and anticipates improvement beyond that.

These actions, plus a further extension of LHA delivery schedules, reduced the pressure on labor resources. Personnel were transferred from the east to the west yard, and some commercial work scheduled for the west yard was transferred to the east yard. This seems to be an effort by Litton to expedite and sustain progress on the DD-963 shipbuilding program.

These favorable developments, accompanied by more vigorous personnel management programs and improved training programs, offer promise but must be monitored closely until they have succeeded.

Factors which may affect planned versus actual work force goals include Litton's ability to (1) recruit and keep personnel, (2) achieve manpower productivity levels, and (3) maintain its plan to accept no new work in the east yard which might pull critical skilled labor off the Navy programs.

Currently the direct-labor work force numbers approximately 12,000. Management projects a decline in needed force through March 1973, a rise to slightly over 14,000 in late 1974, and a decline as the programs move toward completion. These projections are based on existing contracts plus follow-on DD-963 procurements up to 30 ships and on a constant level of submarine overhaul work; they do not include any new major contracts.

Maintaining the work force levels with replacements is a formidable task, because the monthly attrition is 4-1/2 to 5 percent. Ingalls officials advised us that, to curb the unfavorable attrition rate, they are:

--Exit-interviewing all employees to determine their reasons for leaving. The feedback is provided to managers for corrective action.

--Interviewing all new employees 1 week and 1 month after they are hired to solve problems of adjustment to new jobs and the company.

--Having supervisors interview all applicants to tighten screening and to show prospective employees their work places.

--Recruiting more from the South and fewer from long distances.

--Initiating reference checks for all applicants being considered for employment.

--Establishing controls on those who abandon their jobs without proper notice, to assist departments in maintaining accurate head counts.

--Providing internal placement section assistance for any employees who feel that they want to transfer from one department to another because they are qualified, would be happier, and could make more money.

In addition to recruiting, Ingalls conducts two entry-level training programs (one funded by Ingalls and one funded by the Federal Government) for direct-labor-force personnel. Although the curriculum is basically the same for both programs, the Government-funded program is designed to assist the disadvantaged and underprivileged minorities.

The chart on page 15 shows the extent of slippage between the contract delivery date and the currently estimated delivery date for each ship constructed or planned for construction in Litton's west yard.

To relieve west yard congestion Litton moved the construction of four American President Lines (APL) merchant ships and one Farrell Lines merchant ship to the east yard. These ships are shown in block A of the chart. This move was necessary to compensate for the slippage on the merchant ships and to accommodate the Navy ships under contract. The chart shows the delays in completing the Farrell ships, the projected delays in delivery of the LHAs, and the destroyer delivery schedule which is in accord with contractually established delivery dates.

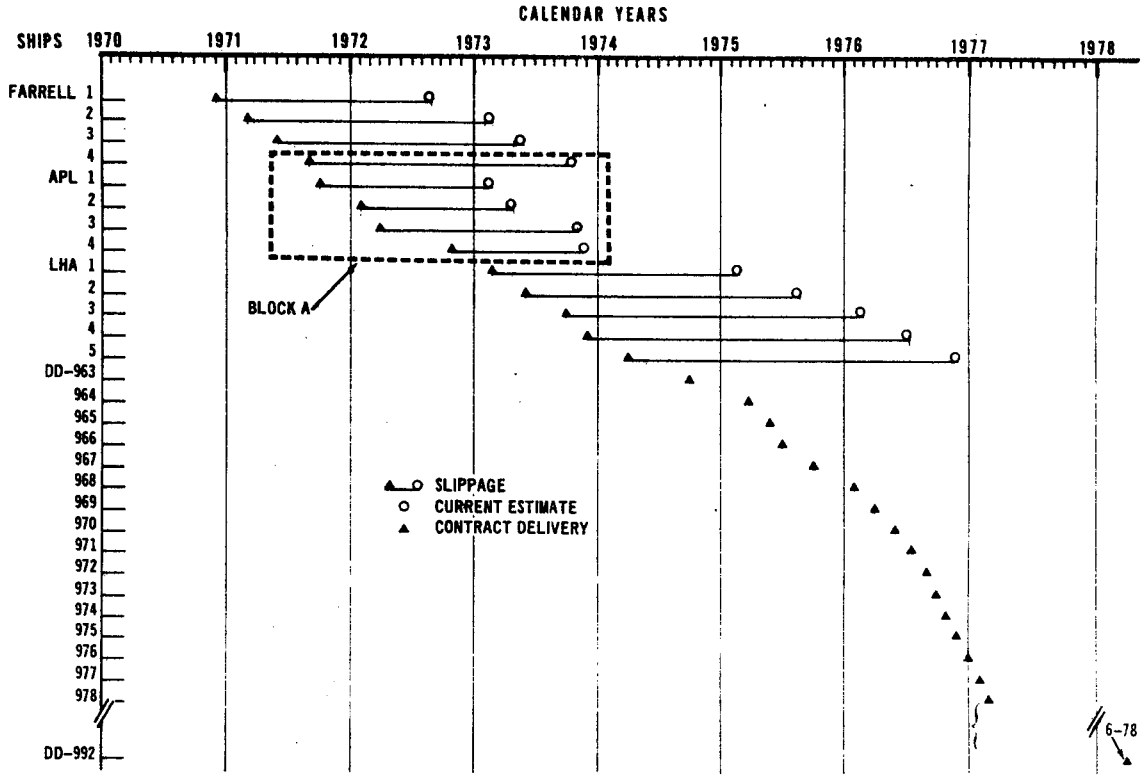
The chart also shows that by the fall of 1973 all commercial work under contract will be completed. However, whether the delivery scheduled for the two Navy programs can be achieved is not known. For example, the first LHA was originally scheduled for delivery 19 months before delivery of the first destroyer. Under present schedules the first destroyer will be delivered about 5 months before the first LHA. The unintended overlap in production of the LHAs and the destroyers may cause problems not previously anticipated. Although the two programs have been completely integrated in plans, we believe some slippage in delivery of the destroyers must be anticipated.

The management decision to accept no new work in the east yard which would affect current schedules should enhance the chances of meeting the LHA and DD-963 delivery schedules. Sometime, however, new work will be needed to provide sufficient leadtime to preclude lowering the yard activity beyond a reasonable economic level. Current schedules indicate that, to maintain production capability, Ingalls must obtain new work to begin in the first quarter of 1975. If Ingalls wants to maintain its engineering capability, it will need to find work to support it in early 1974.

In August 1972 the Navy set 12 major construction milestones on the first LHA, and Litton completed them all on time or early. Present management also has taken the initiative of moving up the DD-963 construction schedule, working around missing drawings, and keeping substantially to this schedule thus far.

These actions, plus announced changes in the policy for hiring and managing the labor force, indicate that a much more forceful attempt is underway to demonstrate Litton's ability to build these ships. Only time will show whether this increased effort will last. Certainly in 1 year, the stability of this management and sustained accomplishment will be visible. On the basis of these actions and the recent production audits, the Navy appears to be more optimistic about the completion of both shipbuilding programs.

COMPARISON CONTRACT DELIVERY SCHEDULE VS CURRENT ESTIMATE



CHAPTER 4

SOME IMPLICATIONS OF THE CONTRACTING CONCEPTS

It would be a serious oversight not to recognize the unique nature of the procurement for these two programs. For the first time, the Navy has delegated to the contractor almost complete responsibility for decisions in the program execution and complete design responsibility, including conceptual work, parametric studies, and preliminary drawings. Litton is also responsible for:

1. Systems; therefore, less Government-furnished equipment is supplied.

2. Integration of all ship systems, including design of the command and control system and associated computer support.

3. The integrated logistic support system, including maintenance and supply support. Litton identifies skills and numbers of crew to man the ships as well as training programs and manuals supporting maintenance and operations.

Requiring the contractor to establish unit costs for production and delivery schedules on complex products at an early time and to guarantee performance before design and test have been accomplished poses a serious responsibility on Litton in this form of procurement. Actual cost, schedule, and performance often do not match these early contractual commitments, and the differences are the root of much of the criticism of apparent cost growth. However, serial production after the design is stabilized should have some advantages: It improves component standardization where it is not otherwise obtained (ships), restrains the Government in requesting changes in design, permits the contractor to stabilize its work force and work plan with mutual benefit from the efficiencies achieved, and stimulates improvements in shipyard plant and methods. But it does inhibit the participation of the Government agencies which must monitor the acquisition process to insure that, within the terms of the contract, the program is progressing in a manner consistent with the funding authorization and that the ships being produced are compatible with the fleet and its support systems.

Final appraisal of how these concepts affected the programs will not be known until all of Litton's claims are resolved. Both parties have made charges claiming actions or inactions.

CHAPTER 5

PROGRAM COST ESTIMATES

THE LHA PROGRAM

Serious problems have been encountered in getting the LHA program underway. Both the Navy and Litton project cost increases on the LHA contract, but Litton's estimate is substantially higher than what the Navy considers allowable under the terms of the contract. They disagree on who is responsible for the problems and resulting cost growth.

The Navy's estimate at February 28, 1973, when a contracting officer's decision was issued unilaterally establishing a contract price, was $1,139 million. The following table shows a comparison of this with earlier program estimates.

Quantity under procurement	9 ships	5 ships	5 ships
	Estimate		
	4-15-69	6-30-72	2-28-73
	(millions)		
Basic ship contract costs:			
Contract target price	$1,012.5	$562.5	$ 562.5
Contract ceiling price increment	-	-	103.8
Cancellation costs	-	109.7	109.7
Changes	40.9	27.1	19.3
Total (excludes escalation)	1,053.4	699.3	795.3
Reserve for contract changes	-	-	7.9
Escalation estimate	73.5	85.4	150.8
Government-furnished equipment	179.3	134.7	134.6
Other costs	18.0	9.5	9.5
Total production	1,324.2	928.9	1,098.1
Outfitting and postdelivery	33.8	18.8	18.8
Procurement cost	1,358.0	947.7	1,116.9
Development cost	22.3	22.3	22.3
Total program cost	$1,380.3	$970.0	$1,139.2
Procurement unit cost	$ 150.9	$189.5	$ 223.4
Program unit cost	153.4	194.0	227.8

The Navy's February 28 estimate is based on prices established in the LHA contract dated May 1, 1969. This

fixed-price-incentive contract establishes a per-vessel target price of $112.50 million and a per-vessel ceiling price of $133.25 million. Therefore, the target price for five ships is $562.5 million. The estimate recognizes an increase to the per-vessel ceiling price which adds $103.8 million ($20.75 million X 5) to the price. The $109.7 million increase is specified in the contract as the maximum cancellation charge that may be paid to Litton as a result of canceling the last four LHAs. The Navy's current estimate for escalation represents additional escalation expected over the $85.4 million budgeted. The increase is based primarily on the Navy's new projection of the Bureau of Labor Statistics indices which are used to forecast escalation and on the increase in the contract ceiling price.

LHA NEGOTIATIONS

The Navy and the contractor began negotiating LHA price changes about March 31, 1972, recognizing the cancellation of four ships, escalation estimate changes, and delays and changes in the contract. Negotiations on these items were scheduled for completion by February 28, 1973. Since the Navy and Litton were not able to reach a negotiated settlement, a contracting officer's decision was issued on February 28, 1973.

Events leading to these negotiations began in December 1970, when Litton requested an extension in the delivery time of the LHA-1. Shortly thereafter, the Navy notified Litton that it intended to reduce the number of ships to be constructed and delivered under the contract. On April 23, 1971, the Navy and Litton agreed to consider in one proposal and negotiation the reduction from nine to five ships; the establishment of the most economical, firm, and realistic delivery schedule mutually agreed upon; the establishment of a firm target cost, target price, and ceiling price; revised labor and material escalation provisions; and other appropriate matters.

The agreement obliged Litton to submit a proposal by October 29, 1971. In late summer of 1971, Litton notified the Navy it would not be able to submit the proposal by that date. Submitting the proposal on March 31, 1972, Litton proposed a total firm target price of $1,039 million for five LHAs. Included in the proposed target price was a cost

component termed a "request for equitable adjustment" amounting to $246.6 million.

On June 23, 1972, the Navy wrote Litton that it had reviewed the March 31 proposal and had found it almost completely unresponsive to the requirements specified in the April 23, 1971, agreement.

On August 30, 1972, the Navy rejected Litton's request for equitable adjustment claim because it was based on an unacceptable total cost and total time. The Navy offered to evaluate any claim resubmitted which demonstrated cause and effect.

On August 31, 1972, Litton and the Navy executed a contract modification which gave the contracting officer the right to unilaterally determine certain unresolved issues if the parties failed to agree on such issues by February 28, 1973. The Navy and Litton conferred on many occasions and sought to negotiate and agree on suitable revisions and adjustments as contemplated by the April 23, 1971, agreement and the August 31, 1972, modification.

At February 28, 1973, no agreement had been reached on any of these unresolved issues and the contracting officer made a unilateral determination on each outstanding issue. This action established a total contract price of $795.3 million, a delivery schedule, a progress payment system, and escalation provisions. The amount of funds now estimated to complete the program over the $970 million previously approved is $169.2 million. These funds are included in the fiscal year 1974 budget, but no reserve for claims has been designated.

On March 1, 1973, Litton announced that its Ingalls Shipbuilding division and the Navy were $108 million apart in the negotiation of a final fixed price to produce five LHAs. Litton said (1) the difference between its estimate and the Navy's estimate represents the cost of work and schedule delays caused by the Navy's actions and not included in the original contract, (2) the Navy's unilateral price is unreasonable and unrealistic, and (3) it intends to seek an equitable settlement.

The next day Litton notified the Navy that it was appealing the contracting officer's decision to the Armed Services Board of Contract Appeals. On March 30 Litton requested a 90-day extension for filing the complaint because of the complex legal and factual questions requiring review and the amount in issue (over $400 million). The complaint was submitted on July 5, 1973. In it Litton alleges that the contracting officer's determination establishing, among other things, the firm target price of $795.3 million, the delivery schedule, and cancellation costs was in error. Due to the stage of these proceedings and the complexities involved, the Board could not estimate when its review would be completed.

REIMBURSEMENT UNDER THE LHA CONTRACT

In most fixed-price construction contracts, payments are made on the basis of the percentage of physical progress made in performing the contract. The fixed-price-incentive LHA contract, however, provided for payments on the basis of physical progress starting 40 months after award. Payments for the first 40 months were to be on a cost-incurred basis to cover anticipated high startup and preliminary design effort. Litton's price proposal was conditioned upon including these provisions in the contract.

The cost-incurred method of payment was to have ceased on September 1, 1972, by which time the amounts that would have been paid on the basis of physical progress were to have been computed and compared with payments. To the extent that payments exceeded those that would have been made on the basis of physical progress, Litton was to repay the difference to the Government. The contract also provided that further payments by the Navy be suspended until Litton repaid. For a variety of reasons, the Navy extended the date for progress payment conversion to February 28, 1973. The progress measurement issues were to be negotiated by that date or determined unilaterally by the Navy in case of disagreement.

On September 29, 1972, Litton submitted a proposed system for measuring physical progress. During negotiations the Navy and Litton reached agreement on the system but failed to reach agreement on specific weighting factors necessary to measure physical progress and on measurement of material physical progress. Accordingly, the contracting officer's decision of February 28, 1973, specified the

weighting factors and the manner for measuring material progress.

The Navy informed Litton that after March 1, 1973, payments would be made on the basis of physical progress rather than the cost incurred. The Navy said that Litton owes the Navy approximately $55 million for payments in excess of physical progress payments earned.

On March 1, 1973, Litton said the failure of the unilateral decision to recognize the Navy's responsibility for costs and delays had established the need to repay $55 million. Litton said that such a repayment was not due and that it would oppose the Navy's claim.

On March 6, 1973, Litton obtained a temporary restraining order barring the Navy from collecting any payments on this debt. As of July 1973, the restraining order was still in effect and the Navy continued to reimburse Litton on a cost-incurred basis.

THE DD-963 PROGRAM

Since the contract was signed in June 1970, the reported program cost estimates have not significantly changed. On the other hand, because the first keel was laid in late November 1972, it is much too early to say that the program will not experience cost growth. Indeed, some cost growth in this program probably can be expected for reasons discussed later in this section.

The DD-963 program estimate at December 31, 1972, was determined as follows:

Quantity under procurement	30 ships
	Estimate
	(millions)
Basic ship cost	$1,947.4
Escalation	396.8
Government-furnished equipment	320.8
Other costs	56.7
Total production	2,721.7
Outfitting and postdelivery	45.8
Procurement cost	2,767.5
Development cost	37.6
Total program cost	$2,805.1
Procurement unit cost	$ 92.3
Program unit cost	93.5

This estimate is an increase of $223.9 million from the original program estimate of $2,581.2 million. The difference is primarily attributable to a $223.7 million increase to more realistically reflect probable escalation costs under the program.

Some reservations regarding the future stability of these estimates are probably in order. Litton and the Navy have no major technical disagreements, but very little experience has developed in construction to demonstrate the actual productivity and the shipbuilding learning curve. Furthermore, the Congress expressed reservations in 1972 when it declined to authorize the next block of 7 ships (beyond the 16 authorized), providing only long-leadtime item funding. The stress in Litton caused by this situation tends to freeze the announced cost estimates for the 30-ship program and the delivery schedule. If variances arise, Litton is likely not to disclose them until after authorization or sometime in the future when the full program seems committed.

The Congress funded the first three fiscal year increments of three, six, and seven ships as programed. The fiscal year 1973 budget request for the next increment of seven ships was cut, however, from $610 million to $247 million as provided in the Department of Defense Appropriation Act of fiscal year 1973, dated October 28, 1972. Although the $247 million permits advance procurement of contractor- and Government-furnished equipment, construction funding has been deferred to fiscal year 1974. The balance of the required construction funding has been requested in the fiscal year 1974 Navy budget submission along with advance procurement funding for the last increment of seven destroyers. Construction funding for the last seven ships will be requested in the fiscal year 1975 budget. Litton has concurred in this funding plan.

The construction of 30 Navy ships of the same design in 1 yard is a rarity. From other experiences, continued learning and reduction of unit cost may take place throughout production. However, the advantage of serial production in this yard is yet to be demonstrated.

For the present program cost to remain stabilized, the Navy will have to defer substantial changes in the weapon

systems until after individual ship delivery. Recognizing that uncontrolled changes have, in past programs, resulted in significant cost growth, schedule slippages, and performance degradation, the Navy has taken extraordinary steps to control such changes, as follows:

1. Several boards and the project manager must analyze and evaluate all recommendations for changes. Changes can be made only as specifically approved and directed by the project manager after complete analysis of cost, schedule, and effectiveness. The Chief of Naval Operations must approve changes which adversely affect characteristics, increase cost, or delay the production schedule.

2. The ship to be constructed is described in the contract. Major ship system changes can be made only after the proposed new system has been thoroughly analyzed and justified to the Chief of Naval Operations, the Secretary of the Navy, and the Secretary of Defense--through the Defense Systems Acquisition Review Council process--and then only after funds are obtained through congressional review and appropriation. Thus, major system changes in the ship must be fully funded before they are implemented.

Notwithstanding these efforts, the Navy's past experience gives little encouragement that these destroyers really will be built to a single configuration. However, if controls now planned by the Navy are strictly enforced, the changes in configuration should be kept to a minimum.

CHAPTER 6

PROGRAM SCHEDULE

THE LHA PROGRAM

The Contractor reported the first slippage on the LHA program in December 1970. At that time, it was estimated that the LHA-1 would be delivered about 10 months late. The following schedule shows estimated slippage at other points in the program.

	Contractually established delivery dates at 5-1-69	Estimates of slippage at 6-30-71 (note a)	6-30-72 (note b)	2-28-73
		(months)		
LHA-1	3-30-73	12	19-1/2	23-1/2
LHA-2	6-29-73	13	21-1/2	26-1/2
LHA-3	10- 1-73	14	22-1/2	29
LHA-4	12-31-73	14	24-1/2	31
LHA-5	4- 1-74	14	26	32-1/2

[a]Slippage shown at 6-30-71 is the same as that in the memorandum of agreement dated April 23, 1971.

[b]Slippage shown at 6-30-72 is the same as that in the contractor's March 31, 1972, reproposal.

The reasons for the slippages are entangled in the charges and countercharges between Litton and the Navy. More important is the prospect for schedule keeping in the future. There are no major technical problems, and changes are being held down to a very low level. The key issues remain: Whether present management can increase the labor force productivity to the planned level, provide skilled craftsmen when needed, synchronize the production plan, and sustain pressure on these factors for the necessary time. Short of major changes in design (which no one foresees), natural catastrophies, or work stoppages, Government confidence that it will be done seems to be slowly growing. Another year, with stable management, should tell.

THE DD-963 PROGRAM

The original 30-ship delivery schedule is still current. Phasing the yard operations is highly complex, and ship deliveries are as frequent as one per month. The schedule on page 15 appears to be a success-oriented schedule allowing little time for the many kinds of in-process delays which normally occur, but it is too early in this program to know whether the very tight schedule can be maintained.

A few factors might cause serious delays.

--The shakedown and debugging of a large number of completed ships in rapid succession may become a bottleneck.

--The staffing of the requisite number of contractor ship test crews can be difficult to accomplish.

--Any requirements to add additional electronics and ordnance could introduce major changes in cost and schedules if implemented before delivery.

CHAPTER 7

OBSERVATIONS

We believe, looking ahead, that some cost growth and schedule slippage can be expected on the DD-963 program. These can be minimized if the managerial and other reforms discussed above take effect. The outlook for meeting cost and schedule targets can be best presented by examining the uncertainties and unfavorable factors and the favorable factors.

The uncertainties and unfavorable factors--in addition to normal escalation--are as follows:

--Litton has had no experience with a meaningful learning curve and productivity on the DD-963 program, since the first keel was not laid until November 1972.

--Major design changes or additional requirements could cause the cost and schedule thresholds to be exceeded.

--Further slippage in the LHA schedule must be avoided. Although it now looks possible for the two programs to proceed concurrently, further slippage in the LHA program would interfere with workload scheduling in the various shops, which would undoubtedly affect the DD-963 program.

--The DD-963 production schedule, which has reached one ship delivery per month, is very optimistic. Such a tight schedule fails to allow for unanticipated problems in the shakedown phase, which could create a bottleneck.

The favorable factors are:

--Improvements in management, labor, and planning.

--The opportunity for learning-curve improvements that building 30 ships of the same design in 1 facility offers.

--The fact that the DD-963 is not stretching technology.

--The fact that Litton has already developed, and the Navy had concurred in, a plan for concurrent production of the LHAs and the destroyers in the west yard.

--Merchant ships are scheduled to be completed in calendar year 1973.

On the LHA program, one major unresolved issue is Litton's claim. Other than this, many of the same uncertainties and unfavorable factors in the DD-963 program apply to the LHA program. The favorable factors are the same, except the opportunity for learning-curve improvements is not nearly as great as for the DD-963 program. To keep abreast of these factors, we believe that the Navy should continue to periodically review Litton's efforts through on-site production audits. These should continue at least until modular construction is achieved and meaningful experience has been gathered on productivity and learning curves.

In summary, although the current outlook is generally good in view of the management changes in process and the design stability which has now been reached, the ship programs are at such an early stage that a clear judgment on achievement of cost and schedule goals is not possible.

AGENCY AND CONTRACTOR COMMENTS

The material presented in this report was presented in a GAO staff study released in March 1973 for use in authorization and appropriation committee hearings. At that time we discussed our proposed report with Navy and contractor officials. They agreed with the facts presented and offered suggestions which have been incorporated as appropriate. Written comments were not obtained from either party.

PRINCIPAL OFFICIALS OF THE DEPARTMENTS OF DEFENSE AND THE NAVY RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF DEFENSE		
SECRETARY OF DEFENSE:		
Vacant	May 1973	Present
Elliot L. Richardson	Jan. 1973	May 1973
Melvin R. Laird	Jan. 1969	Jan. 1973
Clark M. Clifford	Mar. 1968	Jan. 1969
DEPUTY SECRETARY OF DEFENSE:		
William P. Clements, Jr.	Jan. 1973	Present
Kenneth Rush	Feb. 1972	Jan. 1973
Vacant	Jan. 1972	Feb. 1972
David Packard	Jan. 1969	Dec. 1971
Paul H. Nitze	July 1967	Jan. 1969
DEPARTMENT OF THE NAVY		
SECRETARY OF THE NAVY:		
John W. Warner	Apr. 1972	Present
John H. Chafee	Jan. 1969	Apr. 1972
Paul R. Ignatius	Sept. 1967	Jan. 1969
CHIEF OF NAVAL OPERATIONS:		
Adm. Elmo R. Zumwalt, Jr.	July 1970	Present
Adm. Thomas H. Moorer	Aug. 1967	June 1970
COMMANDER, NAVAL SHIP SYSTEMS COMMAND:		
Rear Adm. Robert C. Gooding	Aug. 1972	Present
Rear Adm. Nathan Sonenshein	Aug. 1969	July 1972
Rear Adm. E. J. Fahy	Feb. 1966	July 1969