



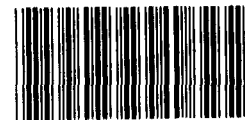
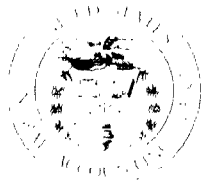
United States General Accounting Office

Report to the Chairman, Committee on
Armed Services, House of
Representatives

July 1990

NAVY MAINTENANCE

Cost Growth and Schedule Overrun Problems Continue at the Shipyards



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United States
General Accounting Office
Washington, D.C. 20548

**National Security and
International Affairs Division**

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July 24, 1990

The Honorable Les Aspin
Chairman, Committee on
Armed Services
House of Representatives

Dear Mr. Chairman:

In response to discussions with your office, we reviewed the costs to overhaul and repair Navy ships at public and private shipyards. We found that cost growth and schedule overruns occurred at these shipyards.

We are sending copies of this report to the Chairmen, Senate Committee on Governmental Affairs, House Committee on Government Operations, Senate Committee on Armed Services, and Senate and House Committees on Appropriations; the Director, Office of Management and Budget; and the Secretaries of Defense and the Navy.

This report was prepared under the direction of Martin Ferber, Director, Navy Issues, who may be reached on (202) 275-6504 if you or your staff have any questions. Other major contributors are listed in appendix II.

Sincerely yours,

A handwritten signature in cursive script that reads "Frank C. Conahan".

Frank C. Conahan
Assistant Comptroller General

Executive Summary

Purpose

The Navy spends over \$4 billion a year to accomplish depot level maintenance and modernization of Navy ships at public and private shipyards. At the request of the House Committee on Armed Services, GAO determined the extent and causes of cost growth and schedule overruns at the shipyards.

Background

Since the early 1970s, the Navy has revised its strategies for maintaining and modernizing ships by scheduling fewer regular overhauls and, instead, performing shorter, more frequent depot level repairs. Work on more complex ships, such as submarines, carriers, and nuclear-powered surface ships, generally is done in eight public shipyards. Work on less complex ships, such as auxiliary and amphibious ships, is routinely done in 44 private shipyards.

The Naval Sea Systems Command is responsible for the maintenance and modernization of Navy ships and has management control of the eight public shipyards and 15 Supervisors of Shipbuilding, Conversion and Repair offices. The latter offices plan and manage work on Navy ships performed at private shipyards located in their geographical areas.

Results in Brief

Cost growth and schedule overruns occurred at both private and public shipyards during fiscal years 1985 to 1988. In the private sector, the cost growth averaged over 30 percent and 37 percent of the ships had schedule overruns. In the public sector, the cost growth averaged over 3 percent and 54 percent of the ships had schedule overruns.

The causes of cost growth and schedule overruns were many and varied and ranged from poorly defining the work to be done to adding alterations after work had begun. Some causes were common to both private and public shipyards while others were unique to one or the other.

The Navy is aware of the problems, but past efforts to correct them have not been fully successful, as evidenced by the continued cost growth and schedule overruns. A new plan to correct depot maintenance problems was recently approved by the Secretary of the Navy. This plan is a step in the right direction, but more corrective actions are needed.

Principal Findings

Cost Growth and Schedule Overruns Are Large

GAO compared contract award prices with final contract prices for maintenance work on 402 ships, which was completed at private shipyards between fiscal years 1985 and 1988. GAO found that the contract costs had increased from \$2.8 billion to \$3.7 billion, a difference of about 30 percent. The final prices exceeded the award prices on 357 of the 402 contracts.

GAO also compared initial government estimates with actual costs at completion of maintenance work on 238 ships at public shipyards during the same period. The costs increased from \$8.4 billion to \$8.7 billion, a difference of about 3 percent. This figure is not fully comparable to the growth at private shipyards because government estimates for work at public shipyards generally include a 10-percent growth factor not included in the contract award prices for private shipyards.

Originally scheduled completion dates frequently were exceeded. At the private shipyards, work on 169 of 453 ships, or 37 percent, overran the original schedules by an average of 43 days. At the public shipyards, work on 129 of 238 ships, or 54 percent, overran the original schedules by an average of 81 days.

Causes Are Numerous

Many factors contributed to the cost growth and schedule overruns. In the private sector, the highly competitive market for Navy ship maintenance and modernization work has caused contractors to submit low price proposals to obtain the Navy work. According to Navy officials, the more competition favorably influences the contract award price, the more incentive a contractor has to find a need for contract modifications and to be uncompromising in negotiating the price of the modifications.

Other reasons for the schedule delays and the cost increases at private shipyards include the inability to determine exact maintenance requirements beforehand, poorly defined work packages, inadequate and late government furnished information, problems in obtaining materials, government-caused delays and disruptions, and unplanned work added after contract award.

At the public shipyards, some of the reasons for the delays and increased costs were similar to those in the private sector. The conditions of the ships were not adequately known beforehand, work packages were poorly defined, problems were encountered in obtaining materials, and unplanned work was subsequently added. In addition, labor resources sometimes were insufficient to execute the work load properly. Also, since 1985 the Navy has placed more emphasis on cost control and less on schedule adherence. As a result, the percentage of ships meeting scheduled completion dates in public shipyards had decreased to 33 percent in fiscal year 1988.

Some Corrective Action Has Been Initiated

The Navy is aware of the depot maintenance problems GAO found and has initiated some corrective actions. In January 1989, the Navy issued a detailed study report on ship depot maintenance at public shipyards. The report contained 37 recommendations in the areas of Navy organization and planning, internal shipyard schedule and cost efficiency, sustaining a core work force, and developing a long range depot maintenance strategy. In January 1990, the Secretary of the Navy approved a plan to implement the recommendations related to improving work done at public shipyards.

Although the recommendations and plan are generally positive, they do not provide details on such matters as how to improve work packages and specifications or how to eliminate problems with materials. Also, the plan deals solely with public shipyards and does not cover private shipyards.

Recommendations

GAO recommends that the Navy (1) ensure that the plan to correct problems in ship depot maintenance at public shipyards is fully implemented and (2) develop and implement a similar plan to correct depot maintenance problems at private shipyards. In both cases, details on how best to improve such areas as work packages, government furnished information and materials, and scheduling should be explained in the plans. A mechanism for reporting and measuring progress also should be provided in the implementation plans.

Agency Comments

The Department of Defense generally agreed with GAO's findings and recommendations (see app. I) and noted that the Navy has taken a series

of initiatives in an effort to minimize the cited problems. The Department anticipates that these efforts will significantly reduce future cost growth and schedule overruns in both the public and private shipyards.

In view of ongoing initiatives, the Department did not believe it is necessary to develop a formal plan to correct problems at private shipyards, but it agreed that a mechanism for reporting and measuring the progress in implementing these initiatives would be developed when the feasibility is proven in the public sector. GAO believes the development of such a mechanism would be a useful planning element but continues to believe an overall plan is needed for the private shipyards.

Contents

Executive Summary		2
Chapter 1		8
Introduction	Objectives, Scope, and Methodology	10
Chapter 2		12
Shipyards Frequently Incur Cost Growth and Schedule Overruns	Cost Growth at Shipyards	12
	Schedule Overruns at Shipyards	13
Chapter 3		15
Many Factors Contribute to Cost Growth and Schedule Overruns	Reasons at Private Shipyards	15
	Causes at Public Shipyards	18
	The Navy Has Initiated Some Corrective Action	22
	Conclusions	23
	Recommendations	23
	Agency Comments and Our Evaluation	23
Appendixes	Appendix I: Comments From the Department of Defense	26
	Appendix II: Major Contributors to This Report	38
Tables	Table 1.1: Total Number of Availabilities	8
	Table 1.2: Costs and Ships From 1975 to 1991	9
	Table 2.1: Cost Comparisons for Private Shipyards	12
	Table 2.2: Cost Comparisons for Public Shipyards	13
	Table 2.3: Schedule Overruns at Private Shipyards	13
	Table 2.4: Schedule Overruns at Public Shipyards	14

Abbreviations

DOD	Department of Defense
GAO	General Accounting Office
NAVSEA	Naval Sea Systems Command
SUPSHIP	Supervisor of Shipbuilding, Conversion And Repair

Introduction

Depot level maintenance and modernization of Navy ships are accomplished in eight public shipyards and approximately 44 private shipyards. Work on more complex ships, such as submarines, carriers, and nuclear-powered surface ships, is generally done in public shipyards. Work on less complex ships, such as auxiliary and amphibious ships, is routinely done in private shipyards.

The Naval Sea Systems Command (NAVSEA) is responsible for the maintenance and modernization of Navy ships. Its Industrial and Facility Management Directorate has management control of the eight public shipyards and the 15 Supervisors of Shipbuilding, Conversion and Repair (SUPSHIP). The SUPSHIP offices plan and manage the work on Navy ships in private shipyards located in their geographical areas.

The Navy has moved from regular scheduled overhauls performed every 3 to 4 years toward shorter, more frequent, intermittent depot level repairs called selected restricted availabilities and phased maintenance availabilities. This trend for the period between fiscal years 1983 and 1991 is shown in table 1.1.

Table 1.1: Total Number of Availabilities

Fiscal year	Overhauls	Selected restricted availabilities	Phased maintenance availabilities	Total
1983	59	72	8	139
1984	53	88	10	151
1985	55	106	17	178
1986	33	99	31	163
1987	39	108	54	201
1988	22	87	64	173
1989	23	98	69	190
1990 ^a	19	118	64	201
1991 ^a	13	98	45	156

^aThese are estimates.

Under the various maintenance strategies, the Navy maintains, repairs, and sometimes makes improvements to modernize ships. Assignment of a ship to a repair activity for this work is called an availability.

Since 1975, costs for the ship maintenance and modernization program for the active fleet have ranged from a low of \$1.6 billion in fiscal year 1975 to a high of over \$6 billion in fiscal year 1985. The fluctuations in costs and total Navy ships are shown in table 1.2.

Table 1.2: Costs and Ships From 1975 to 1991

Dollars in millions			
Fiscal year	Maintenance costs	Modernization costs	Total ships
1975	\$1,140.5	\$434.5	496
1976	1,490.5	569.8	484
1977	1,903.4	669.2	477
1978	2,563.5	545.2	468
1979	2,508.9	772.3	473
1980	2,642.5	763.1	479
1981	3,195.0	952.7	491
1982	3,632.3	932.8	513
1983	4,201.2	896.6	513
1984	4,214.7	1,086.5	523
1985	4,779.6	1,397.7	542
1986	4,179.7	1,398.6	540
1987	4,244.4	1,344.7	546
1988	3,551.1	959.4	565
1989	3,454.7	1,017.0	566
1990 ^a	4,152.9	^b	551
1991 ^a	3,531.5	^b	546

^aThese are estimates.

^bBefore fiscal year 1990, funds for installing modernization projects were included in the operations and maintenance appropriation and funds for acquiring the equipment to be installed were included in the Other Procurement, Navy appropriation. Starting in 1990, installation and equipment funds were combined under the Other Procurement, Navy appropriation.

In our 1986 report entitled *Navy Maintenance: Costs to Overhaul Navy Ships at Private Shipyards* (GAO/NSIAD-86-27), we discussed 105 regular ship overhauls performed in private shipyards from fiscal year 1982 through May 1985. We found that overhaul prices increased significantly between the time of contract award and the time of contract completion. Such increases occurred under each of the 105 contracts, which consisted of 75 fixed-price contracts and 30 cost type contracts. Overall, the prices increased from \$1,133 million to \$1,695 million, a difference of \$562 million, or about 50 percent.

The increases in contract costs between award and completion were the result of modifications for growth work and new work. The Navy categorizes growth work modifications as those relating to technical shortfalls in the original work package and new work modifications as those pertaining to requirements not included in the work package. According to the Navy, growth work accounted for 76 percent of the

cost increases on fixed-price contracts and 66 percent of the increases on cost type contracts.

Objectives, Scope, and Methodology

Our objectives were to determine (1) the extent of cost growth and schedule overruns at both public and private shipyards and (2) the causes of the increases.

During our review, we interviewed Navy officials and examined pertinent documents at Navy headquarters, fleet commands, four public shipyards (Mare Island, Norfolk, Pearl Harbor, and Portsmouth), and three SUPSHIP offices (Boston, Long Beach, and San Diego). In addition, we obtained schedule data from NAVSEA for 453 ships on which depot level maintenance work had been completed at private shipyards between fiscal years 1985 and 1988 and schedule and cost data for 238 ships on which depot level work had been completed at public shipyards during the same period. Because of difficulties in separating government furnished labor and material costs from contractor costs for maintenance work on some ships, NAVSEA was only able to provide final contract price data for 402 of the 453 ships completed in private shipyards.

We did not include 31 ships in our review because they were part of a separate public/private competition program and the Navy handled them differently from regularly assigned ships. This program was initiated in 1985 to provide competition between public and private shipyards. Each competing shipyard submits a price proposal for selected maintenance work and the work is awarded to the shipyard with the best proposal.

For ship maintenance completed by private shipyards, we compared contract award prices, government estimates at the time of award, and final contract prices. For public shipyards, we compared predicted end costs at the start of maintenance with the actual costs at completion. We also compared original completion schedules with actual completion dates for both private and public shipyards.

To identify the causes of cost growth and schedule overruns for selected ships, we reviewed Navy files related to maintenance work completed on 33 ships at private shipyards and 52 ships at public shipyards. For this phase of our review, we selected ships with large cost growth and schedule overruns. We contrasted private and public shipyards to only a limited extent because the data bases and operational methodology for each sector were not comparable.

Chapter 1
Introduction

Our review was made in accordance with generally accepted government auditing standards and was performed between July 1989 and May 1990.

Shipyards Frequently Incur Cost Growth and Schedule Overruns

Cost growth and schedule overruns occurred at both private and public shipyards. In the private sector, the cost growth averaged 31 percent and the schedule overruns averaged 43 days. In the public sector, the cost growth averaged 3 percent and the schedule overruns averaged 81 days.

Cost Growth at Shipyards

In the private sector, ship maintenance and modernization costs increased significantly between the time the contracts were awarded and the time the contracts were completed. Table 2.1 summarizes our comparison of the contract award prices for 402 contracts with the final completion prices for these contracts.

Table 2.1: Cost Comparisons for Private Shipyards

Dollars in millions

Fiscal year	Number of ships	Award amount	Final price	Percent of change
1985	76	\$686	\$924	34.7
1986	103	639	872	36.5
1987	107	952	1,228	29.0
1988	116	572	716	25.2
Total	402	\$2,849	\$3,740	31.3

The final prices exceeded the award prices on 357 of the 402 contracts. The difference between the final contract prices and the contract award prices averaged 31 percent. One of the reasons for the large increase was that the contract award amounts were influenced by competition and did not include factors for cost growth. Although table 2.1 shows a downward trend in the percentage of cost growth, preliminary data for fiscal year 1989 indicate that this trend has been reversed and the percentage of cost growth is higher than it was in 1988.

In the public sector, the differences between the government estimates at the start of maintenance and the actual costs at completion were not as great. Table 2.2 summarizes the results of our comparison for work completed on 238 ships between fiscal years 1985 and 1988.

Table 2.2: Cost Comparisons for Public Shipyards

Dollars in millions				
Fiscal year	Number of ships	Government estimate	Actual cost	Percent of change
1985	67	\$2,474	\$2,554	3.2
1986	53	1,812	1,754	-3.2
1987	60	1,880	1,889	0.5
1988	58	2,278	2,507	10.1
Total	238	\$8,444	\$8,704	3.1

The actual costs exceeded the government estimates on 97 of the 238 ships. The difference between the government estimates and the actual costs averaged 3 percent. A major reason for the relatively small difference is that the government estimate is an agreed upon price between the shipyard and the customer (fleet and type command) before the start of the work. In addition, the government estimate generally includes a 10-percent growth factor.

The Navy has been able to absorb the cost growth for work done by both private and public shipyards within approved budgets because the budgets are based on historical costs for similar ships rather than on contract award prices in private shipyards or initial government estimates in public shipyards. Also, whenever cost growth becomes apparent, the Navy makes program decisions to adjust work packages of other ships scheduled for future maintenance and modernization to bring the total program back into balance.

Schedule Overruns at Shipyards

Original scheduled completion dates frequently were exceeded at both private and public shipyards. Table 2.3 presents our analysis of completion dates for 453 ships at private shipyards. It shows that 169 ships, or 37 percent, had schedule overruns.

Table 2.3: Schedule Overruns at Private Shipyards

Fiscal year	Number of ships	Ships with overruns	Percent with overruns
1985	94	29	30.9
1986	121	38	31.4
1987	113	47	41.6
1988	125	55	44.0
Total	453	169	37.3

Schedule overruns for the 169 ships averaged 43 days, with 69 ships exceeding 30 days. The overruns ranged from 1 day to 259 days. As shown in table 2.3, the number and percentage of ships with schedule overruns have been increasing since fiscal year 1985.

Table 2.4 presents our analysis of completion dates for 238 ships at public shipyards. It shows that 129 ships, or 54 percent, had schedule overruns.

Table 2.4: Schedule Overruns at Public Shipyards

Fiscal year	Number of ships	Ships with overruns	Percent with overruns
1985	67	24	35.8
1986	53	31	58.5
1987	60	35	58.3
1988	58	39	67.2
Total	238	129	54.2

Schedule overruns for the 129 ships averaged 81 days, with 71 ships exceeding 30 days. The overruns ranged from 1 day to 526 days. As shown in table 2.4, the number and percentage of ships with schedule overruns have been increasing since fiscal year 1985.

Many Factors Contribute to Cost Growth and Schedule Overruns

Our review indicated that the causes of cost growth and schedule overruns were many and varied and ranged from having poorly defined work packages to adding alterations after work had begun. Some causes were common to both private and public shipyards while others were unique to one or the other.

The Navy is aware of the problems, but past efforts to correct them have not been fully successful, as evidenced by the continued cost growth and schedule overruns. The Secretary of the Navy recently approved a new plan to correct depot maintenance problems at public shipyards. This plan is a step in the right direction, but more corrective actions are needed.

Reasons at Private Shipyards

Our review of individual ships identified many reasons for cost growth and schedule overruns at the private shipyards. These reasons included intense competition between private shipyards, inability to determine exact maintenance requirements beforehand, inadequate and late government furnished information and materials, government-caused delays and disruptions, and work added after contract award. Some of these causes were beyond the Navy's control but others, such as inadequate specifications, delays and disruptions, and work additions, were within its control.

Competition

Contractor bids are influenced by competition and do not include factors for cost growth. The market for Navy ship maintenance and modernization work is very competitive because no commercial ships are being built and little commercial ship repair work is being performed in the United States. Private shipyards have more capacity than the Navy needs, and contractors tend to submit low price proposals to obtain the Navy work. Some Navy officials told us that contractors later take every opportunity to increase the price after the contract is awarded. According to these Navy officials and industry experts, contractors routinely "low-ball" the Navy in the expectation of "getting well" on contract modifications.

Current laws and regulations provide no basis to exclude an otherwise technically acceptable, responsible contractor from a competition solely on the basis that the contractor submitted an excessively low contract price proposal. If it can be determined that the contractor can sustain the loss and is otherwise responsible, the Navy must award the contract.

The regulations, however, caution the contracting officer to take appropriate action to ensure that losses are not recovered by the contractor through the pricing of charge orders or follow-on contracts.

Data compiled by the Shipbuilders Council of America indicate that the U.S. shipbuilding and ship repair industry is almost totally dependent on the government for ship construction and ship repair work. For example, in 1987 about 95 percent of the private industry's work was dedicated to government orders. The Council reports that many private shipyards are going out of business and that, between October 1982 and the end of 1987, 41 shipyards closed and 32,000 production workers lost their jobs.

Because competition is intense for the limited amount of government work, the Navy is receiving favorable contract award prices. Contract award prices on the 453 ships awarded between 1985 and 1988 averaged 22 percent below the estimates the Navy had developed for budget projections and comparative purposes before awards. However, subsequent contract modifications more than offset this difference.

All Required Maintenance Cannot Be Identified Beforehand

According to Navy officials, identifying all required maintenance on a Navy ship is almost impossible until a ship is dry-docked and cut open, the power plant is shut down, and the ship and equipment are inspected and tested. For example, after dry-docking the USS Dixon, the Navy found accelerated deterioration of the hull. Repairing the hull added \$7 million to the contract cost and extended the dry docking time by 60 days. The Navy and contractors have to modify the contracts to accomplish the additional work that is subsequently identified. Unlike the contract award price that is influenced by competition, the price of contract modifications is negotiated solely with the contractor.

The amount of labor and material required to do the modification is negotiated and a forward pricing rate and a profit factor are applied. The forward pricing rate is based on a contractor's experienced costs and is audited by the Defense Contract Audit Agency and approved by the SUPSHIP office. Because a profit factor is applied, the more contract modifications, the more opportunities a contractor has to recover from the effect of a low-ball bid. According to Navy officials, the more competition favorably influences a contract award price, the more incentive a contractor has to find a need for contract modifications and to be uncompromising in negotiating the price of modifications.

Inadequate Government Information and Material

We analyzed selected modifications to 33 contracts and found that inadequate and late government furnished information and materials were among the major causes of contract cost growth and schedule overruns on 23 of the contracts. The worst case examples were noted on contracts that involved major new alteration packages. For example, 355 drawing changes were made between the time a contract was awarded for the USS Fife and the time the contractor was to start work. By the time work on the ship was completed, 849 changes were made to the government furnished information. The contractor was paid about \$9 million to implement these changes, and the scheduled completion date was extended 30 days.

On the same contract, the contractor requested \$4 million for equitable adjustment for late and deficient government furnished material. The government settled the request for about \$2 million. The contract award price of this overhaul was \$28.2 million and the final price paid was \$47.9 million, a growth of \$19.7 million. According to a SUPSHIP official, the same contractor later finished an almost identical work package on a sister ship, the USS O'Brien. SUPSHIP is projecting a final price of between \$30.8 million and \$32.8 million on this ship, some \$15 to \$17 million less than the first ship. According to the SUPSHIP official, some of the reduction is due to a more fully defined work package and lessons learned by the contractor on the first ship.

Navy headquarters and SUPSHIP officials stated that if they waited until major alteration work packages were fully defined, the desired alterations would never be made on all the ships. Fully defining major alteration work packages requires substantial time. According to Navy officials, getting the alterations on ships as quickly as possible was more important than the additional costs that resulted from poorly defined work packages.

Government-Caused Delays and Disruptions

Government-caused delays and disruptions to contractors also result in cost growth and schedule overruns. The causes for the delays and disruptions can vary from contract modifications to Navy personnel getting in the way of a contractor's work force. The amount of the claims can be significant. For example, in the \$28.2 million contract for the USS Fife, the contractor was paid over \$6 million for delays and disruptions.

Additional Work Directed After Contract Award

Cost growth and schedule overruns may result from the Navy deciding to do additional work after contract award. For example, after a contract is awarded, the Navy may decide to add a ship alteration. Such a decision will result in cost growth and may also result in a schedule overrun. For instance, the Navy added a new weapon system alteration to the USS Tripoli that resulted in a 1-month overrun of the scheduled completion date.

Although fleet and type command officials state that only repairs necessary to correct existing faults that would prevent successful operation of a ship are ordered after contract award, SUPSHIP personnel told us that, because of a favorable contract award price, the Navy sometimes requests additional alterations and previously deferred maintenance after contract award. One NAVSEA official said the work package expands to consume the available funding. A January 1989 NAVSEA study cites the inability of fleet and type commanders to control growth and new work effectively as a cause of cost growth and schedule overruns.

Other Factors

In its comments on our draft report, the Department of Defense (DOD) agreed with the above reasons but stated that other factors also contributed to cost growth and schedule overruns at private shipyards. These factors included (1) weather, labor strikes, late discovery of material deficiencies, and poor contractor quality controls and (2) award of contracts to small, marginally qualified ship repair contractors that take on large, complex repair jobs and experience tremendous learning curves.

Causes at Public Shipyards

As with the private shipyards, we identified many reasons for cost growth and schedule overruns at the public shipyards. Reasons include labor resources out of balance with the work load; work packages poorly defined; unplanned work later added; ship conditions not adequately reflected in initial estimates; problems in obtaining materials; billing rates differed from actual rates; and Navy philosophy of schedule adherence changed. Most of these causes were within the Navy's control.

The Commander, NAVSEA, acknowledged some of these causes in March 1989 testimony before the Subcommittee on Seapower and Strategic and Critical Materials of the House Committee on Armed Services. He indicated that public shipyards exceeded costs and schedule due to a number of factors, including initial estimates that did not reflect the

condition of a ship, major increases in the scope of work during an overhaul, and the lack of enough workers or an improper mix of skills given the work load.

Labor Resources Out of Balance With Work Load

When a shipyard becomes overloaded and has insufficient workers to properly execute the work load, cost growth and schedule overruns result. Public shipyards may become overloaded for a number of reasons, including extensive emergency work, late assignment of ships, major schedule delays once a ship is in maintenance, and schedule changes by the fleet for budgetary reasons.

At the Pearl Harbor shipyard, a schedule overrun on the fiscal year 1984 overhaul of the USS Los Angeles required using resources planned for the overhaul of the USS Omaha. The result was that 46,552 man-days of planned effort could not be used on the Omaha in fiscal year 1985. This started a bow wave of incomplete work. Fiscal year 1986 resources planned for the USS New York City and the USS Birmingham were diverted to complete the Omaha. According to a shipyard official, it will be well into fiscal year 1990 before the shipyard fully recovers from the ripple effect of the Los Angeles schedule overrun.

A similar overload condition from a schedule overrun occurred at the Puget Sound public shipyard. The schedule slippage started in February 1985 with the overhaul of the USS Pargo and remained a problem in the shipyard for 4 years. The slippage ultimately affected the completion dates for 11 submarines. Schedule overruns are costly. For example, a schedule overrun of a nuclear submarine costs about \$35,000 a day, according to a Puget Sound shipyard official.

The fleets also contribute to the problems shipyards have in scheduling work. The fleets often move ship maintenance starts across fiscal years for financial reasons, such as to obligate funds available at the end of a year. Thus, a shipyard will find either a sudden overload or a sudden reduction in planned work. According to the Navy, this results in higher overhead costs, critical skills imbalances, and greatly reduced efficiency, as well as schedule delays.

Poorly Defined Work Packages

Public shipyards cited poorly defined work packages and poorly prepared drawings and specifications as part of the cause for cost growth and schedule overruns for 18 of the 52 ships we analyzed. As in private shipyards, we found the worst case examples generally involved major

new alteration packages, such as the New Threat Upgrade alterations. These alterations were made to modernize the combat systems of certain classes of destroyers and cruisers and included upgrading and integrating various radars and combat information centers. The Commander, NAVSEA, cited numerous New Threat Upgrade design changes as the major cause of cost growth at the Philadelphia shipyard. This shipyard experienced a cost growth of 16 percent on the ships we reviewed.

At the Mare Island shipyard, the USS Dolphin work package was so poorly defined that repairs were ordered for equipment no longer installed on the ship, while repairs of other items as important as a hull valve that could cause a ship to sink if it malfunctions were omitted from the work package.

Addition of Unplanned Work

Frequently, a need for additional work will be identified after ship maintenance and modernization have begun or NAVSEA may decide to add an alteration. For instance, after dry-docking the USS New Jersey at the Long Beach shipyard, the need for extensive hull repairs was determined. Completing this work resulted in both cost growth and schedule overruns. In another case, adding a new work requirement on the turbine generators near the end of the USS Groton overhaul contributed to a \$13.3 million cost growth and a 354-day schedule overrun at the Portsmouth shipyard.

Condition of Ship Not Adequately Reflected

Sometimes cost and schedule estimates do not adequately reflect the condition of a ship. Some of the older classes of submarines are in poorer condition than initially believed and more work is required to bring them up to standard. The first overhauls on other classes, such as the SSN 688 class submarines, have just begun. The Navy used notional durations and man-day caps that were based on experience with other submarines in estimating the cost and length of the overhauls. The Pearl Harbor shipyard has met neither the man-day cap nor the notional duration. On the first four SSN 688 class submarines, the shipyard averaged 29 months an overhaul as opposed to the notional duration of 15 to 18 months. The shipyard, on the basis of this experience, now believes that neither the cap nor the notional duration was reasonable.

Material Problems

Shipyard officials cite various types of material problems as causes of cost growth and schedule overruns, such as (1) late delivery of material, (2) insufficient quantities of material ordered, (3) wrong materials

ordered as a result of bad specifications or misreading the specifications, and (4) material not ordered in time because of changes in assignment of ships for maintenance. For instance, during maintenance on the USS Guardfish, the Mare Island shipyard had to manufacture valves and other parts because they were not available. In addition, tooling kits were received late and in a not ready-for-issue condition. Tools were rusty, unusable, or not itemized and packed properly. A planned ship alteration was deferred because materials were not available.

Stabilized Rates Different From Actual Rates

Some cost growth in the public sector is due to a difference between the stabilized man-day rate and the actual man-day rate experienced by a shipyard. Stabilized man-day rates are computed each year using prior years' actual costs and are adjusted to account for such factors as pay raises. Public shipyards use these rates to estimate the predicted end cost at the start of maintenance and to bill the customers. If a stabilized rate is more than an actual rate, a shipyard will realize a gain. If a stabilized rate is less than an actual rate, cost growth will result.

The stabilized rate used to estimate the alteration costs for the USS Trepang was \$326.80 and the actual rate experienced by the Portsmouth shipyard was \$419.97. A Mare Island shipyard status report showed potential gains or losses due to differences between stabilized rates and actual rates on five ship overhauls: USS Hammerhead, \$22.1 million gain; USS Haddock, \$6.4 million gain; USS Aspro, \$2.3 million loss; USS Guardfish, \$2.5 million loss; and USS Guitarro, \$9.2 million loss.

Change in Navy Schedule Adherence Philosophy

A change in Navy philosophy appears to have negatively affected schedule adherence. Before fiscal year 1985, the Navy emphasized adherence to schedule completion dates. Between fiscal year 1983 and the first quarter of fiscal year 1985, public shipyards completed maintenance work on 138 of 165 ships, or about 84 percent, on time. Special actions to keep the ships on schedule included using overtime, adding a third work shift, and borrowing personnel from other shipyards. These actions all added to the costs of repairs.

During fiscal year 1985, the Navy put more emphasis on cost control and less emphasis on schedule adherence. Overtime caps and hiring freezes were placed upon the shipyards. Since that time, the percentage of ships meeting scheduled completion dates has decreased, to 33 percent in fiscal year 1988. Moreover, despite the increased emphasis on

cost control, cost growth increased from 3 percent in fiscal year 1985 to 10 percent in fiscal year 1988.

The Navy Has Initiated Some Corrective Action

Over the years the Navy has made several studies on ways to improve the performance of shipyards. A January 1989 Navy study entitled Ship Depot Maintenance Study stated that a major cause of problems in ship depot maintenance has been a lack of balance between available skilled workers in public shipyards and the highly complex work load assigned. This imbalance is due to a lack of coordination and stability in scheduled work and to programming and budgeting decisions made without full understanding of their impact on shipyard operations.

The study also stated that shipyard inefficiency contributed to delays and increased costs. Inefficiency of internal industrial processes and general problems in planning, estimating, scheduling, and executing work have been chronic and, if improved, they would make the shipyards more cost and schedule effective.

The study contained some 37 recommendations in the areas of changing Navy organization and policy, correcting internal shipyard schedule and cost efficiency problems, sustaining a core work force, and developing a long range depot maintenance strategy. The study also concluded that a flag steering group should be formed to ensure rapid, effective resolution of competing issues and formulation of effective cooperation and planning.

According to Navy officials, a flag steering group was formed and, after reviewing the study, developed a plan for correcting depot maintenance problems at public shipyards. In January 1990 the Secretary of the Navy approved the suggested plan. The officials stated that the suggested plan is in line with the recommendations of the January 1989 study. Included in the implementation plan are such actions as developing a plan to level shipyard work load over the next decade, reviewing the senior management structure in the shipyards, and supporting improved military construction funding levels for shipyards. Although the recommendations and plan are generally positive, we noted that they do not provide details on such matters as how to improve specifications and work packages or how to eliminate problems with material. The officials also stated that the plan deals solely with the public shipyards and does not cover the private shipyards.

Conclusions

Many factors contributed to the cost growth and schedule overrun problems and past Navy efforts to correct these problems have not been fully successful. The current plan, if properly implemented, should help alleviate these problems at public shipyards. A similar plan needs to be developed and implemented at the private shipyards. This plan should recognize both the similarities with the public shipyards and the unique characteristics of the private shipyards.

In both cases, the corrective actions need to be precisely detailed. The problems we identified in such areas as work packages, government information and materials, work additions, and shipyard and fleet scheduling have been long-standing and general recommendations will not correct these problems.

During our review, Navy officials stated that getting major alterations on ships as quickly as possible was more important than the additional costs that resulted from poorly defined work packages. We believe that this position should be reevaluated and cost factors should be given more emphasis. This is particularly true in light of the changing security threat and the leveling of the DOD budgets.

Recommendations

We recommend that the Secretary of the Navy

- ensure that the Navy's plan to correct problems in ship depot maintenance at public shipyards is fully implemented and
- develop and implement a similar plan to correct depot maintenance problems at private shipyards.

In both cases, we recommend that details on how best to improve such areas as work packages, government furnished information and materials, and scheduling be explained in the plans. These plans also should ensure that cost is a major consideration in deciding when and where to make ship alterations. Further, we recommend that the implementation plans provide a mechanism for reporting and measuring progress.

Agency Comments and Our Evaluation

DOD agreed with our recommendations to correct the problems at the public shipyards. DOD stated that the Secretary of the Navy had formed a Naval Industrial Review Council, with the Secretary as chairman, to ensure that approved recommendations and goals are fully implemented. Approximately 30 decision papers that contain detailed plans

for improving a variety of problems associated with ship depot maintenance are being implemented. Reporting and measuring systems will be instituted as part of the implementation process.

With regard to the private shipyards, DOD stated that a formal plan to correct depot maintenance problems was not necessary because the Navy had implemented a series of corrective initiatives to improve cost and schedule performance at private shipyards. These initiatives include

- adding discipline to the work package development process in the areas of work screening, planning, work specification development and quality assurance;
- increasing the use of preaward surveys to evaluate a contractor's past performance;
- invoking the contract liquidated damages clause as a disincentive to slipping schedules and retaining the prerogative to bring in a third party to accomplish work that cannot be negotiated at a fair price;
- deferring additional work to a later availability whenever possible; and
- placing representatives at a contractor's shipyard to provide technical support and guidance.

DOD stated that a method of documenting and reporting successful implementation of these initiatives, through a monitoring and tracking system, would be developed when the feasibility is proven in the public sector. We believe the development of such a system would be a useful planning element. However, we continue to believe that an overall plan is needed for the private shipyards.

Comments From the Department of Defense



ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D.C. 20301-8000

PRODUCTION AND
LOGISTICS
(L/MD)

June 20, 1990

Mr. Frank C. Conahan
Assistant Comptroller General
National Security and
International Affairs Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Conahan:

This is the Department of Defense (DoD) response to the General Accounting Office (GAO) draft report, "NAVY MAINTENANCE: Cost Growth and Schedule Overrun Problems Continue at the Shipyards," dated May 2, 1990 (GAO Code 394314), OSD Case 8330. The Department agrees with the report findings and recommendations.

It should be noted that the Navy has already taken steps to minimize the problems cited in the draft report. It is anticipated those efforts will significantly reduce future cost growth and schedule overruns in both the public and private shipyards.

The detailed DoD comments on each finding and recommendation are provided in the enclosure. The Department appreciates the opportunity to comment on the draft report.

Sincerely,

David J. Berteau
David J. Berteau
Principal Deputy

Enclosure

GAO DRAFT REPORT - DATED MAY 2, 1990
(GAO CODE 394314) OSD CASE 8330

"NAVY MAINTENANCE: COST GROWTH AND SCHEDULE OVERRUN PROBLEMS
CONTINUE AT THE SHIPYARDS"

DEPARTMENT OF DEFENSE COMMENTS

* * * * *

FINDINGS

- **FINDING A: Background: Maintaining And Modernizing Navy Ships.** The GAO reported that, since the early 1970s, the Navy has revised its strategy for maintaining and modernizing ships by scheduling fewer and fewer regular overhauls and, instead, performing shorter, more frequent, intermittent depot level repairs--called selected restricted availabilities and phased maintenance availabilities. (The GAO demonstrates this trend for the period FY 1983 through FY 1991 in report table I.1.) The GAO further reported that the Navy spends over \$4 billion a year to accomplish these availabilities at public and private shipyards. (The GAO shows the costs for the period FY 1975 through FY 1991 report in table 1.2--noting that, in FY 1990, funding for installation of modernization projects was transferred from operations and maintenance to procurement accounts.) The GAO observed that work on the more complex ships, such as submarines, nuclear carriers, and nuclear powered surface ships, is usually carried out at eight naval shipyards--while less complex ships, such as auxiliary and surface ships, are routinely done in the 44 private shipyards. The GAO observed that the Naval Sea Systems Command, through its 15 Supervisors of Shipbuilding, Conversion and Repair Offices, plans and manages work performed at the private shipyards. (pp. 1-2, pp. 9-11/GAO Draft Report)

DoD RESPONSE: Concur.

- **FINDING B: Cost Growth At Private Shipyards.** The GAO referred to a prior report, in which it found a 50 percent overall growth in 105 overhauls performed during the period FY 1982 through FY 1985. For the current report, the GAO compared contract award amounts (totaling \$2.8 billion) with final contract prices (which totaled \$3.7 billion) for maintenance work that was completed on 402 ships during the period between FY 1985 and FY 1988. The GAO found that the cost growth in the private shipyards averaged over

Enclosure

Now on pp. 2, 8, and 9.

30 percent--and that the final price exceeded the award amount on 357 contracts. (The GAO summarized those figures, by year, in report table 2.1.)

For the same period, the GAO also compared initial Government estimates totaling \$8.4 billion with actual costs at completion, which totaled \$8.7 billion for 238 ships at public shipyards. The GAO found that the cost growth was about 3 percent. (The GAO summarized those figures in report table 2.2.) The GAO noted that the private and public growth figures are not fully comparable (1) because estimates at public shipyards generally include a 10 percent growth factor and (2) because that estimate is an agreed-upon price between the shipyard and the customer.

The GAO found that the Navy has been able to absorb the cost growth within approved budgets because the budgets are based on projections of historical costs for similar ships. The GAO also found that the Navy makes program decisions to adjust work packages or schedules on other ships to keep the program in balance. The GAO concluded that, at the private shipyards, during the period FY 1985 to FY 1988, the cost growth was large. (pp. 2-3, p. 11, pp. 15-17/GAO Draft Report)

DoD RESPONSE: Concur. The DoD agrees there has been cost growth at private shipyards during the period FY 1985 - FY 1988, although growth has substantially declined over the previous five year period due to actions taken by the Navy. It is misleading, however, to compare cost growth in the private and public sectors because of the different bases used to calculate cost growth in the respective sectors. The private sector award price is basically a function of market pressures and competition, whereas the public sector's Government estimate represents the shipyard's Predicted End Cost.

- **FINDING C: Schedule Overruns At The Shipyards.** In report table 2.3, the GAO lists schedules for 453 ships at private shipyards, showing overruns for 169 of them (37 percent). The GAO calculated that the overruns averaged 43 days. The GAO also presented the schedules for 238 ships in public shipyards, showing 129 (or 54 percent) with overruns. The GAO calculated that the overruns in this group averaged 81 days. The GAO concluded (1) that originally scheduled completion dates frequently were exceeded and (2) that, since 1985, the number and percentage of ships with schedule overruns has been increasing-- at both private and public shipyards (p. 2, p. 4, pp. 18-19/GAO Draft Report)

Now on pp. 2, 3, 9, 12, and 13.

Now on pp. 2, 3, 13, and 14.

DoD RESPONSE: Concur. Schedule overruns at public shipyards for the last 4 years are directly attributable to an unusually high number of submarine overhaul starts, beginning in the FY 1985 - FY 1988 timeframe, which created a serious imbalance between workload and shipyard trade and management skills. The Navy has taken steps to alleviate these problems. (See the DoD responses to Finding F and Recommendation 2.)

- **FINDING D: Many Factors Contribute To Cost Growth And Schedule Overruns At Private Shipyards.** The GAO reported that many factors contributed to cost growth and schedule overruns at private shipyards, as follows:

- **Competition.** The GAO observed that current laws and regulations provide no basis to exclude an otherwise technically acceptable, responsible contractor solely on the basis that his price proposal is excessively low. The GAO further observed that there is over capacity and a very competitive market for ship maintenance and modernization work in private shipyards. The GAO found that, because the competition is so intense, the Navy is receiving favorable contract award prices ["buy-ins"]--averaging 22 percent below the Navy estimate for the period FY 1985 through FY 1988.
- **All Required Maintenance Can Not Be Identified Beforehand.** The GAO noted that, according to Navy officials, identifying all required maintenance is almost impossible until the ship is dry-docked. The GAO noted, for example, that accelerated deterioration of the hull was found on the USS DIXON, extending dry-docking time by 60 days. The GAO reported that the contract modifications to accommodate such additional work are negotiated sole source--and the more competition influenced the initial contract price award [the extent of the "buy-in"], the more incentive a contractor has to be uncompromising in negotiating the add-on work.
- **Inadequate Government Information And Material.** The GAO analyzed selected modifications to 33 contracts--selected because of large cost growth and schedule overruns--and found that late Government information and materials were among the major causes for the growth. The GAO observed the worst examples were on contracts that involved major new alterations packages. (The GAO noted, for example, that on the USS FIFE, by the time the ship was completed, 849 changes had been made to the Government furnished

information. The GAO also noted that the contract award price for the USS FIFE was \$28.2 million and the final price paid was \$47.9 million--a growth of \$19.7 million.) The GAO reported that Navy headquarters and Supervisors of Shipbuilding personnel claimed that, if they waited until major alterations packages were well defined, the desired alterations would never be made on all the ships. The GAO also reported Navy officials maintained that getting the alterations on the ships done as quickly as possible was more important than the additional costs.

- **Government-Caused Delay and Disruptions.** The GAO found that Government-caused delay and disruptions also result in cost growth and schedule overruns. The GAO noted that, while the causes for the delays and disruptions can vary from contract modifications to personnel getting in the way of the contractor's work force, the amount of the claims can be very significant. (The GAO noted, for example, that \$6 million was paid for delays and disruptions to the contractor on the USS FIFE.)
- **Additional Work Directed After Contract Award.** The GAO found that, after contract award, the Navy may decide to add additional work--such as an alteration. The GAO reported, for example, that a new weapon system added to the USS TRIPOLI in this manner resulted in a one-month delay in the completion date. Despite denials by fleet and type command personnel, the GAO reported Supervisor of Shipbuilding personnel contended that, because of favorable contract award prices, the Navy sometimes requests additional alterations and previously deferred maintenance.

The GAO concluded that the Navy position--i.e., that getting major alterations on ships as quickly as possible is more important than cost--needs to be reevaluated, especially in view of the changing security threat and the reduced level of DoD budgets. (pp. 4-5, pp. 20-26, pp. 34-35/GAO Draft Report)

DoD RESPONSE: Concur. The DoD agrees with the factors identified by the GAO as contributing to cost growth and schedule overruns at private shipyards. Some other factors that contribute to cost growth and schedule overruns are, as follows:

(1) Weather, labor strikes, and late discovery of material deficiencies, as well as poor contractor quality control, are all contributors to delays and cost growth.

(2) Another major factor, not cited in the report, that contributes to cost growth and schedule delays is the awarding of contracts to small, marginally qualified ship repair contractors, who take on large, complex repair jobs and experience tremendous learning curves. This is a function of the competitive process.

The factors that cause delays and cost overruns have been, or are being addressed. The measures being taken are specified in the responses to the report findings and recommendations.

- **FINDING E: Many Reasons For Cost Growth And Schedule Overruns At Public Shipyards.** The GAO identified many reasons for cost growth and schedule overruns at the public shipyards. The GAO noted that the Commander, Naval Sea Systems Command, acknowledged some of the causes in his March 1989 testimony. The GAO observed, however, that most of the causes the GAO identified factors were well within the Navy's control, as follows.

- **Labor Resources Out Of Balance With Workload.** The GAO found that, when a shipyard becomes overloaded and has insufficient workers, cost growth and schedule overruns result. The GAO cited, as an example, the USS LOS ANGELES schedule overrun in FY 1984, which had an impact on Pearl Harbor shipyard resources well into FY 1990. The GAO noted a similar situation at the Puget Sound shipyard, with the overrun on the overhaul of the USS PARGO impacting completion dates for 11 submarines. The GAO also found that the fleets contribute to shipyard problems--for example, by moving ship maintenance starts across fiscal years.

- **Poorly Defined Work Packages.** The GAO reported that poorly defined work packages and poor drawings were cited by the shipyards as causes of cost growth and schedule overruns. The GAO found this particularly true in the case of major new alterations, such as New Threat Upgrades. The GAO reported that the Commander, Naval Sea Systems Command, cited numerous New Threat Upgrade design changes as the major cause of cost growth at the Philadelphia shipyard (which experienced a cost growth of 16 percent on the ships the GAO reviewed). In addition, the GAO cited the USS DOLPHIN work package, which was so poorly defined that repairs were ordered for equipment no longer installed on

the ship--while repairs of other items, as important as a hull valve (that could cause a ship to sink if it malfunctions) were omitted from the work package.

- **Addition Of Unplanned Work.** The GAO found that, frequently, a need for additional work will be identified after work has begun or the Naval Sea Systems Command may decide to add an alteration. The GAO cited the example of the USS NEW JERSEY--where, after dry-docking, the need for extensive hull repairs was determined--resulting in both cost growth and schedule overruns. In another case cited by the GAO, adding a new work requirements on the turbine generators near the end of the USS GROTON overhaul, contributed to a \$13.3 million cost growth and a 354-day schedule overrun.
- **Condition Of Ship Not Adequately Reflected.** The GAO reported that sometimes cost and schedule estimates do not reflect the true condition of a ship. The GAO noted, for example, that some of the older classes of submarines were found to be in a worse condition than anticipated, requiring more work to bring them up to standard than was planned. The GAO also reported that the Pearl Harbor Shipyard has averaged 29 months on the first overhauls of four SSN-688 class submarines versus the 15 to 18 months anticipated.
- **Material Problems.** The GAO listed several types of material problems cited by shipyard officials as causes of cost growth and schedule delays, as follows.
 - late delivery of material;
 - insufficient quantities of material ordered;
 - wrong materials ordered as a result of bad specifications or misreading the specification; and
 - material not ordered in time because of changes in assignment of ships for maintenance.
- **Stabilized Rates Different From Actual Rates.** The GAO found that some cost growth is due to the effect of differences between stabilized manday rates, used to estimate the predicted end costs and bill customers, and the actual manday rates experienced at shipyards. The GAO explained that stabilized manday rates are computed each year, using the prior year's actual costs, and are adjusted to account

for such factors as pay raises. The GAO noted that public shipyards use those rates to estimate the predicted end cost at the start of maintenance and to bill the customers. The GAO pointed out that if the stabilized rate is more than the actual rate, the shipyard will realize a gain. If, on the other hand, the stabilized rate is less than the actual rate, cost growth will result.

- **Change In Navy Schedule Adherence Philosophy.** The GAO found that, prior to FY 1985, the Navy emphasized adherence to schedule completion dates, but during that year the Navy began to put more emphasis on cost control. The GAO observed that change in philosophy appears to have negatively affected schedule adherence--since that time the percentage of ships meeting scheduled completion dates in the public shipyards decreased to 33 percent in FY 1988 (as compared to an 84 percent on schedule rate for the period between FY 1983 and the first quarter of FY 1985). The GAO noted, however, that despite a claimed focus on cost control, cost growth nonetheless increased from 3 percent in FY 1985 to 10 percent in FY 1988.)

The GAO concluded that many factors contributed to the cost growth and schedule overrun problems at the public shipyards--and past Navy efforts to correct these problems have not been fully successful. (p. 5, pp. 26-32/GAO Draft Report)

DoD RESPONSE: Concur. The DoD concurs with the GAO conclusion that past Navy efforts to correct cost growth and schedule problems at public shipyards have not been fully successful. However, recent Navy decisions on necessary corrective measures (discussed in the DoD response to Finding F), as well as planned followup procedures, will assure future success for an efficient ship depot maintenance process.

- **FINDING F: The Navy Has Initiated Some Corrective Actions.** The GAO reported that a January 1989 Navy study, entitled Ship Depot Maintenance Study, stated that a major cause of problems in ship depot maintenance has been a lack of balance between available skilled workers in public shipyards and the highly complex workload assigned. The GAO noted that the study attributed this imbalance to the following:

- a lack of coordination and stability in scheduled work;
- programming and budgeting decisions made without full understanding of their impact on shipyard operations;
- shipyard inefficiency in internal industrial processes; and
- general problems in planning, estimating, scheduling, and executing the work.

The GAO observed the study contained 37 recommendations in the areas of (1) changing Navy organization and planning, (2) correcting internal shipyard schedule and cost efficiency problems, (3) sustaining a core workforce, and (4) developing a long range depot maintenance strategy. The GAO noted that a flag steering group was formed and, after reviewing the study, developed a plan for correcting depot maintenance problems at public shipyards. The GAO noted that, in January 1990, the Secretary of the Navy approved the proposed plan. The GAO concluded that the currently approved plan, if properly implemented, should help alleviate the cited problems at public shipyards. The GAO further concluded, however, that a similar plan needs to be developed and implemented at the private shipyards and should recognize both the similarities with the public shipyards and the unique characteristics of the private shipyards. In addition, the GAO concluded that for both types of shipyards--public and private--the corrective actions need to be precisely detailed. (pp. 32-34/GAO Draft Report)

Now on p. 22.

DoD RESPONSE: Concur. The DoD agrees with the GAO comments regarding the public sector. The following comments are also provided:

(1) The importance of the Secretary of the Navy's approval of the Ship Depot Maintenance Flag Steering Board's decisions to implement corrective actions must be emphasized. As chairman of the recently formed Naval Industrial Review Council, the Secretary has taken a personal interest in improving ship depot maintenance. In addition to the Council, two prominent ongoing initiatives are the Advanced Industrial Management program and the Naval Industrial Improvement Program. The Advanced Industrial Management program is designed to improve technical information, thereby allowing improved packaging, sequencing, and execution of work. The Naval Industrial Improvement Program is making major strides in improving work estimating practices and work execution techniques.

(2) The Navy has implemented several initiatives designed to reduce cost growth and schedule overruns in the private sector, as follows:

(a) Lessons learned are being applied for follow-on availabilities to eliminate repeat cost growth items. In the work package development process, discipline is being added in work screening, planning, work specification development, and quality assurance. Use of standardized specifications will further support this effort.

(b) In contracting, the liquidated damages clause is being invoked as a disincentive to slipping schedules and contracting methods such as incentive fee and negotiated procurement have been instituted. Further, an additional growth requirement clause in the contract has been invoked to provide for a pre-priced reserve of man-hours for growth work.

(c) Prior to award, the Navy is increasing the use of pre-award surveys to evaluate a contractor's past performance as a major factor in future awards.

(d) Growth is being limited where possible. When negotiating in a sole source environment is undesirable, work is being deferred to a later availability whenever possible.

(e) The Navy is retaining its prerogative to bring in a third party to accomplish growth work that cannot be negotiated at a fair price.

(f) After award, planning yard representatives are placed at the contractor's yard to provide technical support and guidance. This action has significantly alleviated late Government information and material problems encountered in new alteration packages.

RECOMMENDATIONS

- **RECOMMENDATION 1:** The GAO recommended that the Secretary of the Navy ensure that the Navy plan to correct problems in ship depot maintenance at public shipyards is fully implemented. (p. 35/GAO Draft Report)

DoD RESPONSE: Concur. The Secretary of the Navy, concurrent with his approval of the Ship Depot Maintenance Flag Steering Board's decisions, formed the Naval Industrial Review Council. The Council's membership includes the Secretary as chairman, the Under Secretary, the Assistant Secretaries of the Navy, and the Chief of Naval Operations. The purpose of the Council is to ensure approved recommendations and goals are fully implemented. Since its recent inception, the Council has met twice. At the most recent meeting, on May 23, 1990, the Council was presented with a Naval Sea Systems Command plan to achieve improvements in this area.

- **RECOMMENDATION 2:** The GAO recommended that the Secretary of the Navy develop and implement a similar plan to correct depot maintenance problems at private shipyards. (p. 35/GAO Draft Report)

Now on p. 23.

DoD RESPONSE: Partially concur. As stated in the DoD response to Finding F, the Navy has implemented a series of corrective measures to improve cost and schedule performance at private shipyards. In view of these ongoing initiatives, a formal plan for the private sector is not necessary. However, a method of documenting and reporting successful implementation of these initiatives, through a monitoring and tracking system, would be appropriate and will be developed when the feasibility is proven in the public sector. Implementation could begin as early as FY 1993.

- **RECOMMENDATION 3:** The GAO recommended that, in both cases, the details on how best to improve such areas as work packages, Government furnished information and materials, and scheduling should be explained in the plans. (p. 35/GAO Draft Report)

Now on p. 23.

DoD RESPONSE: Concur. The Ship Depot Maintenance Flag Steering Board approved and the Naval Industrial Review Council will ensure implementation of approximately 30 decision papers that contained detailed plans for improving a variety of problems associated with ship depot maintenance. The DoD response provided to Finding F above, highlights actions taken by the Navy to reduce cost growth and schedule overruns in the private sector.

- **RECOMMENDATION 4:** The GAO recommended that the Navy plans should ensure that cost is a major consideration in deciding when and where to make alterations to ships. (p. 35/GAO Draft Report)

Now on p. 23.

DoD RESPONSE: Concur. Cost is always a factor in deciding when and where to perform alterations. It is anticipated in the future there will be fewer alterations. This will lead to better definition and lower costs. The Navy initiatives discussed in the DoD response to Finding F are designed to reduce cost and schedule growth.

- **RECOMMENDATION 5:** The GAO recommended that the Navy implementation plans provide a mechanism for reporting and measuring progress. (p. 35/GAO Draft Report)

DoD RESPONSE: Concur. The most effective way to ensure progress is through reporting and measuring systems. The Ship Depot Maintenance Flag Steering Board decisions recommended that such systems be established. The Naval Industrial Review Council is chartered to ensure implementation of the Board's decisions. As part of this process a monitoring and reporting system will be implemented. As previously stated, measurement systems will be introduced into the private sector when they been proven mature in the public sector, which could be as early FY 1993.

Now on p. 23.

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