

United States General Accounting Office

GAO

Report to Congressional Requesters

August 1989

NAVY STEAMING DAYS

Budget and Execution



**National Security and
International Affairs Division**

B-235728

August 2, 1989

The Honorable Daniel K. Inouye
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate

The Honorable John P. Murtha
Chairman, Subcommittee on Defense
Committee on Appropriations
House of Representatives

Funding to maintain the readiness of the Navy's ships plus the proficiency of its crews is provided through the Navy's operations and maintenance appropriation account. Because of the importance of maintaining a high degree of readiness and concerns that funds requested by the Navy were not tied to demonstrable measures of mission accomplishment or effectiveness, the former Chairmen, Subcommittees on Defense, House and Senate Committees on Appropriations, asked us to examine the Navy's steaming activities and determine whether program execution matched the Navy's budget justification to the Congress.

During our review, we briefed the House Committee on Armed Services' staff on the status of our work. Subsequently, that Committee, in its report (House Report 100-563, Apr. 5, 1988), directed the Navy to provide budget justifications that include measurable mission-related goals tied to the resources needed to meet each goal and asked us to monitor the Navy's progress in responding to the requirement. This report responds to both the former Chairmen's requests and the Committee's request. (See app. I for our objectives, scope, and methodology.)

Results in Brief

The Navy's detailed budget justification documents do not identify what the Navy expects to accomplish in terms of training or mission operations with the days its ships sail. Budget estimates begin with historical cost data as a starting point, but additional efforts are made to project costs for carrying out its operating plans. The results of the Navy's steaming operations are primarily measured in terms of days sailed and funds spent. The Department of Defense (DOD) agreed that the performance measures the Navy uses to support its ship operations budget could best be described as measures of general activity rather than precise measures of program effectiveness or achievement. These measures

available all 90 days and sailed for 30 days would have an operating tempo of 30.

In fiscal year 1987 the operating tempo goals were a Navy-wide average of 50.5 steaming days each quarter (about 56 percent of available time for the deployed fleets) and 29 steaming days each quarter (32 percent of available time) for the nondeployed fleets.

Funding and Budgeting for Ship Operations

Ship operations are funded through the general purpose forces budget activity of the Navy's operations and maintenance appropriation account. (Other budget activities within that appropriation account include strategic forces, intelligence and communication, airlift and sealift, and central supply and maintenance.) The Navy's congressional budget submission identifies the total amount requested for the general purpose forces activity as well as amounts requested for each category within this budget activity—ship operations, tactical air/antisubmarine warfare flying, base operations, maintenance of real property, and others.

The Navy, in preparing its budget estimates, accumulates the actual costs for fuel, utilities, repair parts, and other consumable supplies needed to operate the ships by ship type for a completed year. It further evaluates and analyzes prior year's costs in developing these estimates.

The Congress appropriates a single amount for all Navy operations and maintenance activities, and the Navy allocates these funds among each operations and maintenance activity. It may move funds among the various categories within the general purpose forces budget activity throughout the budget year without informing the Congress or obtaining its approval.

The Navy requested \$1.65 billion to fund the direct operating costs (fuel, utilities, shipboard repair parts, and other consumable supplies) of its ships in fiscal year 1987. This budget request was based largely on prior year's costs. According to Navy Comptroller officials, at the time this budget was prepared, 1984 was the last full fiscal year for which data on repair parts, other consumable supplies, and fuel consumption were available from which to extrapolate future requirements and costs. However, these officials stated that prior year's costs were used as a starting point and not as a substitute for analysis and evaluation that led to the development of fiscal year 1987 costs and requirement estimates.

or decreases in a unit's ability to meet a threat. The following initiatives are also ongoing:

- The Navy, along with contractor support, is examining the relationship between a ship's warfare performance in major fleet exercises and steaming days.
- The Center for Naval Analysis is examining the relationship between steaming days and grades earned during refresher training.
- A student at the Naval Postgraduate School is examining the relationship between ships' performance ratings and steaming days.

According to Navy officials, as of April 1989, the results show that relationships exist between the three output measures being examined and steaming days. However, there is no comprehensive output measure that captures all aspects of training and readiness. Additionally, any output measure is not only a function of steaming days but also of other resources, such as staffing and training. According to the Navy, its research indicates that more steaming days leads to improved readiness, but the studies have not quantified how much is enough.

In its estimation, none of the initiatives are expected to produce a relationship sufficiently predictive to drive programming and budgeting decisions. Together, however, they might produce a model that can predict the likely effect of adding or reducing resources. Its current objectives are to construct the model's framework by the summer of 1989, continue developing output measures, and develop a predictive model, with contractor support, in fiscal year 1990.

For purposes of near term reporting to the Congress, Navy Comptroller officials said they would provide the following resource-related measurements in support of the fiscal years 1990 and 1991 budget:

- Average number of ships deployed by major type (e.g., combatants, amphibious, etc.).
- Total number of ship operating months to be supported (either in the aggregate or by class).
- Total number of budgeted underway days (aggregated or by class).
- Number of exercises to be conducted.

Conclusions

Devising the best way to demonstrate the link between the application of resources and the achieved operational readiness is difficult and is

Comments From the Department of Defense



THE OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D. C. 20301-4000

FORCE MANAGEMENT
AND PERSONNEL

08 MAY 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 STEAMING DAYS: Budget and Execution," dated March 15, 1989 (GAO Code 394200/OSD Case 7931). The Department generally concurs in most of the report findings. Certain clarifications and corrections are necessary to make the report fully accurate.

The description in the draft report of the Navy method of calculating ship operations requirements in support of annual budget submissions to the Congress is inaccurate and overly simplified. The analytical process from which the Navy ship operations requirements are developed is substantially more complex and refined than that described in the draft report. A correct description of this process is provided in the DoD response to Finding A in the enclosure.

The Department does not agree with the statement in the draft report that the Navy's current ship operations programs are not measured against performance goals and objectives. The Navy, in fact, uses a variety of performance goals and objectives in order to measure, report, and assess the readiness of its ships. These performance goals and objectives were not designed, however, to support precise, quantitative budget calculations or to be directly incorporated in the Navy ship operations budget submissions to the Congress.

The Department does agree with the long-term desirability of developing a method that measures the effects of incremental resource changes on ship readiness and refining the performance measurements that the Navy now includes in its budget submissions to the Congress. The Department further agrees with the conclusion that devising the best way to demonstrate the link between the application of resources and achieved operational readiness is difficult and is likely to be an evolutionary process.

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GAO DRAFT REPORT, DATED MARCH 15, 1989
GAO CODE 394200, OSD CASE 7931

"NAVY STEAMING DAYS: BUDGET AND EXECUTION"

DEPARTMENT OF DEFENSE COMMENTS

* * * * *

FINDINGS

- o **FINDING A: The Navy's Budget Estimates are Based Largely on Prior Years Costs Rather Than Projected Costs to Execute Its Operating Plans for the Upcoming Fiscal Year.** The GAO found that, in preparing its budget estimates, the Navy accumulates the actual costs for fuel, utilities, repair parts, and other consumable supplies needed to operate the Navy's ships by ship type for a completed year. The GAO also found that the total cost for ship operations is divided by the number of ships in the inventory to compute the average cost by ship type. The average is adjusted for inflation and multiplied by the number of ships that are projected to be in the fleet for the budget year. According to the GAO, the results of the Navy's steaming operations are primarily measured in terms of days sailed and funds spent. However, the GAO noted that the Navy Comptroller officers stated that prior year's costs were used as a starting point and not as a substitute for a subsequent process of analysis and evaluation that ultimately led to the development of FY 1987 costs and requirements estimates. (pp. 1-2, pp. 4-5, GAO Draft Report).

DoD Response: Partially concur. The DoD agrees that prior year's costs were only used as a starting point and not as a substitute for a subsequent process of analysis and evaluation that ultimately led to the development of the Navy's 1987 ship operations costs and requirements estimates.

The DoD does not agree with the GAO description of the Navy method of calculating its ship operations requirements in support of budget estimates to the Congress. All of the Navy ship operations requirements are zero based to the maximum extent that they can be and are tied to both operational and materiel needs.

Historical costs are used as an important and legitimate tool in the development of the future Navy requirements for fuel, utilities, spare parts, and consumables (OPTAR) only to the extent that these costs provide a starting point or baseline for measuring and predicting unit consumption. Thereafter, a number of other operational and economic factors are used in arriving at the Navy

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--- Operating months. Calculated as the difference between total ship months and repair months (i.e., Operating Months = Ship Months - Repair Months.)

-- Having determined the total number of operating months that must be supported during the budget period, the operating months are further allocated to deployed and non-deployed theaters, using the latest carrier battle group deployment plan, long-range employment plans for supporting forces, and other sources to estimate the disposition and planned rotation of notional peacetime forces. The number of deployed and non-deployed operating months is determined for each major type of ship (e.g., carrier, battleship, cruiser, etc.)

-- Having determined, by ship type, the total deployed and non-deployed operating months to be supported during the budget period, notional deployed forces are budgeted at the deployed operating tempo level (average of 50.5 days per quarter or 16.8 days per deployed operating month), while non-deployed forces are budgeted at an average of 29 underway days per quarter (or 9.7 days per non-deployed operating month).

-- In developing fuel requirements, the Navy modeling process also considers:

--- Historical operating patterns and consumption for each ship type in each major theater, which are obtained from the Navy's Energy Usage Reporting System.

--- The historical percentage of time that ships actually spend steaming underway, as opposed to steaming in port or at anchor, in each theater.

--- The non-deployed units typically have access to pierside utilities in their homeport and, therefore, a lesser requirement for inport steaming than their deployed counterparts.

--- Initial fueling of new ships upon their delivery to the Navy.

--- Fuel requirements for engineering plant start-ups, operational testing and sea trials for ships that are transitioning from a repair status to an operational status.

- o **FINDING B: Ship Operations Are Not Measured Against Performance Goals and Objectives.** The GAO reported that neither the Navy budget nor its reporting to the Congress link budgeted requirements and operational expenditures to measures of program achievement. The

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The Navy's current operating tempo objectives (50.5 steaming days per quarter for deployed units and 29.0 days per quarter for non-deployed units) are the product of actual fleet experiences during the early 1980s. The objectives have been successively supported by a series of fleet commanders as the desired level of operations (1) to support peacetime (non-contingency) theater commitments, (2) to prepare adequately ships for overseas deployments, and (3) to maintain an adequate level of surge readiness among ships that are operating at other points in their interdeployment cycles.

Both in its testimony and its reporting to the Congress, the Navy has, for a long time, acknowledged that ship operating tempo and other ship operations performance criteria are "surrogate" measures and not "direct" measures of readiness accomplishment. Over the years, the Navy has also undertaken several efforts to develop a single analytical tool for relating incremental resource expenditures to ship readiness in support of both Service-sponsored and DoD-sponsored initiatives in this area. Despite the efforts of many experienced analysts, no single predictive model or scaled measuring system has yet been developed to take the place of experienced military judgment in gauging the readiness effects of changing resource levels within the Navy ship operations account. Until such time as an appropriate measurement can be developed and tested, the Navy will not be able to further refine the performance criteria that are now included in its budget and its reporting to the Congress.

- o **FINDING C: Direction by the House Armed Services Committee.** The GAO reported that, on April 5, 1988, the House Armed Services Committee directed the Navy (1) to provide budget justifications that included measurable mission-related goals tied to the resources needed to meet each goal and (2) to develop a method for measuring the degree to which the goals and objectives are met. The GAO further reported that the Navy was also requested to examine the variances between its objectives and actual results and to explain the differences. The GAO stated that, according to the Navy, research is being performed to respond to the congressional direction to relate steaming day expenditures to readiness, as follows:

- a contractor is examining the relationship between a ship's warfare performance in major fleet exercises and steaming days;
- a second study by the Center for Naval Analysis is examining the relationship between steaming days and grades earned during refresher training;
- a student at the Naval Postgraduate School is examining the relationship between ships' performance ratings assigned during Propulsion Examining Board inspections and steaming days.

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The GAO found that, although results to date indicate there are relationships between the three output measures and steaming days, there is no comprehensive output measure that captures all aspects of training and readiness. The GAO noted that the Navy plans future work to examine the relationship between the application of resources and the attainment of readiness, with the objective of constructing the model framework by the summer of 1989. The GAO concluded that devising the best way to demonstrate the link between the application of resources and achieved operational readiness is difficult and is likely to be an evolutionary process. (pp. 1-2, pp. 6-8/GAO Draft Report).

DoD Response: Concur. To be fully correct, however, the first statement summarizing the Navy's current study initiatives should be modified to read:

"(1) the Navy staff, with contractor support, is examining the relationship between ship warfare performance in major fleet exercises and steaming days;"

On the basis of its own initiatives in this area, the DoD strongly concurs with the GAO conclusion that the development of a more scientific or quantitative link between the application of resources and achieved operational readiness is likely to be an evolutionary process.

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GAO found that the Navy has not adopted precise mission-related performance objectives describing what the steaming day program is expected to achieve. The GAO observed that, instead, the Navy budget presents its requirements for annual steaming as quarterly OPTEMPO goals, which represents the percentage of time each calendar quarter that Navy ships spend underway for training exercises and operations. The GAO concluded that the Navy budget displays do not identify what it expects to accomplish in terms of training or mission operations with the days its ships sail. (pp. 1-2, pp. 4-5, GAO Draft Report).

DoD Response: Partially concur. The DoD agrees that the performance measures presently used by the Navy to support its Ship Operations budget can best be described as measures of general activity rather than precise measures of program effectiveness or achievement. The Navy has, for years, used such measures as operating tempo (i.e., average underway days per ship per quarter for ships not undergoing major maintenance), steaming hours, and maintenance manhours funded to allow congressional committees to gauge the general effects of program increases and decreases. In response to the House Armed Services Committee direction of 5 April, 1988, the Navy expanded its reporting in the President's FY 1990/FY 1991 Budget Request to include the average number of ships deployed, the number of ship operating months supported and the number of planned exercises to be conducted during each year of the budget. The DoD agrees with the desirability of further studying and refining the ship operations performance measurements that are presently reported to the Congress, but also recognizes the inherent complexities and difficulties that are involved in developing a means for precisely measuring and reporting the mission accomplishment or effectiveness associated with incremental resource expenditures for ship steaming. Further refinement of the Navy Ship Operations performance reporting will require continued study and resource support.

The DoD does not concur, however, with the leading statement of the above finding that the Navy's ship operations are not presently measured against performance goals and objectives. The Navy has established a variety of performance goals and mission-related objectives for its ships in the form of competitive exercise and inspection requirements that must be completed on a periodic basis in order to achieve and sustain various levels of training and materiel readiness in their primary mission areas. The Navy also employs a variety of formal methods for reporting, tracking and assessing the current readiness of its ships. However, none of these tracking methods, either singly or collectively, was originally designed or intended to be used in the development of precise or quantitative predictions of future resource requirements or direct incorporation into the Navy budget estimates. Instead, these methods were developed to inform and support the subjective judgments of responsible military leadership.

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ship operations requirements for any given year. These factors are variable for each subdivision of the ship operations account and are briefly summarized as follows:

- Ship Utilities. Budget requests for ship utilities legitimately and necessarily consider historical billing rates, consumption experience, and appropriate estimates for inflation. However, the development of utilities requirements does not stop there. Anticipated operating levels are also considered. Appropriate adjustments are made for the anticipated number of ships and inport pierside days that must be supported during the budget year.

- Ship Repair Parts. Projected estimates for ship repair parts funding are based on prior-year consumption experience for each ship class, stock fund pricing assumptions, and the carry forward of any backlogs (if applicable) that may exist as a result of the deferred procurement of essential parts. Like utilities, repair parts funding requests are also adjusted to reflect the number and types of ships to be supported during the budget year. The requirements process takes into account the precise funding levels that will be required to support ships that are leaving as well as entering the active inventory during the year.

- Other OPTAR. Projected budget estimates are based on prior-year consumption experience for each ship class, stock fund pricing assumptions, and adjustments to reflect the type and number of ships to be supported. Fleet type commanders also maintain a running list (backlog) of unfunded phased-replacement supply and equipage deficiencies (e.g. firefighting equipment, mooring lines, etc.) that they may or may not choose to reduce during the budget period, depending on resource availability and the operational urgency associated with obtaining the items to be purchased.

- Ship Fuel. The Navy budget estimates for fuel are determined using modeling techniques that are substantially more detailed and sophisticated than those described in the draft report. The major steps in the current Navy method for calculating fuel requirements are, as follows:

-- The total number of ship months to be supported during the budget year is determined from the latest schedule of ship deliveries and retirements.

-- Total ship months to be supported during the budget period are divided into repair months and operating months using the latest schedules for overhauls and major maintenance availabilities in each fleet.

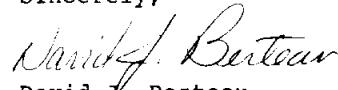
--- Repair months. Obtained by adding up the months that each individual ship is scheduled and budgeted to undergo major repairs.

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Detailed DoD comments on the GAO findings are provided in the enclosure. The Department appreciates the opportunity to comment on the draft report.

Sincerely,



David J. Berteau
Deputy Assistant Secretary of Defense
(Resource Management & Support)

Enclosure:
As stated

Objectives, Scope, and Methodology

Because of the importance of maintaining a high degree of readiness and the concerns of the former Chairmen, Subcommittees on Defense, House and Senate Committees on Appropriations, that funds requested were not tied to demonstrable measures of mission accomplishment, we examined ship operations to determine whether program execution matched the Navy's budget justifications to the Congress. To address this issue, we focused on

- historical program trends (budgeted versus actual),
- the process the Navy uses to budget and manage funds in the ship operations account, and
- the way in which the Navy computes and reports operating tempo.

We reviewed Navy policies, procedures, and practices for ship operations and operating tempo and examined appropriate documents and records. We also interviewed Navy and Department of Defense officials responsible for carrying out these activities and incorporated their views into the report where appropriate.

To gain a further understanding of the budget process as it applies to ship operations, we analyzed Navy budget documents and amounts requested, appropriated, and obligated for fiscal years 1984 through 1987.

We evaluated how the Navy reports operating tempo by reviewing Fleet and Navy Comptroller operating tempo reports and supporting documentation.

Our work was performed in accordance with generally accepted government auditing standards.

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Abbreviations

DOD	Department of Defense
GAO	General Accounting Office

likely to be an evolutionary process. In the near term, the Navy provided additional exhibits showing the levels of activity in terms of ship operations that its proposed fiscal year 1990 budget will support.

Agency Comments

DOD agreed that the Navy needed to (1) develop a method to measure the effects of resource changes on ship readiness and (2) define measures of accomplishment that are included in its budget submissions to the Congress better. In fact, the Navy has already initiated studies to bring this about. DOD stated that the Navy's ship operations are measured against performance goals and objectives. It explained that the Navy has used such measures as operating tempo, steaming hours, and maintenance funded to allow congressional committees to gauge the general effect of program increases and decreases. DOD agreed that these measures are of general activity and are not precise measures of program effectiveness or achievement. It explained that these measures were never designed to support precise, quantitative projections of resource requirements or to be directly incorporated in the Navy's ship operations budget to the Congress. We have modified the report on the basis of DOD's comments.

DOD disagreed with our description of the Navy's method of calculating ship operations requirements in support of its annual budget submission to the Congress. It stated that the analytical process involved in developing ship operation requirements is substantially more complex and refined than we described in our draft report.

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

GAO staff members who made major contributions in this report are listed in appendix III.



Martin M Ferber
Director, Navy Issues

In its comments on this report, DOD also stated that while prior year's costs are used as a starting point, a number of other operational and economic factors are used to develop ship operations requirements for a given year. For example, budget estimates for ship fuel are based on modeling techniques, factoring in a number of complex considerations. Also, budget estimates for ship repair parts are projected on the basis of prior year's consumption and any backlogs, taking into account the funding requirements for ships that are leaving and entering the active inventory during the year. Additional details on the method of calculating ship operations budget requirements are provided in DOD's comments (see app. II).

Ship Operations Are Not Measured by Precise Indicators of Proficiency or Effectiveness

Neither the Navy's budget nor its reporting to the Congress links budgeted requirements and operational expenditures to measures of readiness achievement. The Navy has not adopted readily measurable mission-related performance objectives describing what the Navy expects to achieve with the days its ships sail. The Navy's budget presents its requirements for annual steaming as quarterly operating tempo goals. As stated earlier, operating tempo represents the percentage of time each calendar quarter that Navy ships spend underway for training, exercises, and operations. Days underway, however, are not related to specific training, exercises, or operations (e.g. training for anti-air or antisubmarine warfare).

During our review, the House Committee on Armed Services directed the Navy to (1) provide budget justifications that include measurable mission-related goals tied to the resources needed to meet each goal and (2) develop a method for measuring the degree to which the goals and objectives are met. It also directed the Navy to examine the variances between its budget and actual results, explain the differences, and submit the results of these analyses, along with its annual budget justification. The Navy responded by providing some additional data with its fiscal year 1990 budget request.

Navy Comptroller officials told us that the Navy has worked for years to develop a single analytical tool for precisely relating ship readiness to resource expenditures, but no single predictive model or scaled measuring system has been developed. However, according to the Navy, research is being performed to respond to the congressional direction to relate steaming day expenditures to readiness. The goal of this effort is to produce a model that would indicate the effect of resource increases

were never designed to support precise, quantitative budget calculations or to be directly incorporated in the ship operations budget submitted to the Congress.

Because the Navy's budget submission does not directly relate its costs or funding requests for steaming days to measures of proficiency or effectiveness, it does not permit a determination of the impact on mission effectiveness or fleet readiness of applying more or less resources to steaming days. However, responding to congressional concerns that it tie mission goals to resources needed to accomplish them, the Navy has initiated several efforts to quantify relationships between days sailed and the attainment of skill proficiency and mission readiness. Devising the best way to demonstrate these relationships is likely to be an evolutionary process. In the near term, the Navy provided the Congress additional exhibits to show the levels of activity, in terms of ship operations, that its proposed fiscal year 1990 budget will support.

Ship Operations

Navy ships generally follow an 18-month operating cycle. At any given time about one-third of the Navy's ships are assigned to deployed fleets that sail for a 6-month period to meet operational commitments and perform other tasks in support of national policy objectives. The remaining two-thirds of the ships either are undergoing maintenance or are assigned to nondeployed fleets that sail closer to home ports. Nondeployed ships are used to conduct training exercises to maintain combat readiness in preparation for reassignment to deployed fleets.

The Navy expresses requirements for ship operations in terms of operating tempo goals. Operating tempo is the Navy's primary measure of ship operations, representing the percentage of time each calendar quarter—usually expressed in days—that the ships are involved in training, exercises, and operations. The formula used to determine it is:

$$\text{Operating tempo} = \frac{\text{Ship days underway} \times \text{days in quarter}}{\text{Ship days available (in quarter)}}$$

A day underway is defined as a day in which a main plant is operating for 3 hours or more. Ship days available is the time that a ship is not undergoing scheduled maintenance expected to require 45 days or longer. Although expressed as days, operating tempo is a fleetwide average rate of employment that ships spend at sea for training, exercises, and operations. For example, in a 90-day quarter, a ship that was

