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**REPORT TO THE COMMITTEE ON
MERCHANT MARINE AND FISHERIES
HOUSE OF REPRESENTATIVES**

RELEASED

LM089275

**Utilization Of The
United States Coast Guard
High Endurance Cutter Fleet**
B-114851
Department of Transportation

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

089275

915-251

NOV. 20, 1970



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

B- 114851

Dear Mr. Chairman:

Pursuant to your request of July 31, 1969, we are submitting a report on our review of the utilization of the U.S. Coast Guard's high endurance cutter fleet. In discussions with your staff, it was agreed that we would limit our review to summarizing the utilization of the cutters and evaluating the feasibility of using augmented crews to increase the annual utilization of the fleet and reduce the number of new high endurance cutters required to meet Coast Guard mission requirements.

Because of inadequacies in the Coast Guard's cost accounting system at the time of our review, we are unable to state with any degree of certainty that the cost data included in our report is the same as that which would be developed by a sound and well-conceived cost accounting system. Moreover, the cost data in this report can be significantly affected by future changes in the Coast Guard high endurance cutter mission plan. Our computations of personnel and related vessel costs are based on the best available information but are, in effect, only estimates of the costs of the various program factors.

We discussed the contents of this report with officials of the U.S. Coast Guard and considered their views in preparing this report.

We plan to make no further distribution of this report unless copies are specifically requested, and then we shall make distribution only after your agreement has been obtained or public announcement has been made by you concerning the contents of the report.

Sincerely yours,

Comptroller General
of the United States

The Honorable Edward A. Garmatz
Chairman, Committee on
Merchant Marine and Fisheries
House of Representatives

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COMPTROLLER GENERAL'S
REPORT TO THE
COMMITTEE ON MERCHANT
MARINE AND FISHERIES,
HOUSE OF REPRESENTATIVES

UTILIZATION OF THE UNITED STATES
COAST GUARD HIGH ENDURANCE
CUTTER FLEET
Department of Transportation
B-114851

D I G E S T

WHY THE REVIEW WAS MADE

At the request of the Chairman, Committee on Merchant Marine and Fisheries, House of Representatives the General Accounting Office (GAO) made a review of the utilization of the U.S. Coast Guard high endurance cutter fleet, including an evaluation of the feasibility of using augmented crews to increase the annual utilization of the fleet with a view toward reducing the total number of new cutters required to meet Coast Guard mission requirements. (See p. 31.)

FINDINGS AND CONCLUSIONS

On the basis of an examination of Coast Guard cutter utilization reports, GAO found that:

- A significant increase in the average cutter operating time occurred during fiscal years 1968 and 1969. This increase was attributable to the deployment of cutters to Southeast Asia operations. (See p. 5.)
- During fiscal year 1969, the new Hamilton class cutters were reported in an operational status on an average of 39 percent of the time as compared with 50 percent for all other high endurance cutters. (See p. 10.)
- All cutters, including the new Hamilton class cutters, were reported in a maintenance status an average of about 43 percent of the time during fiscal year 1969. (See p. 9.) Hamilton class cutters in fiscal year 1969 were on standby an average of 18 percent of the time whereas the other cutters averaged 7 percent. (See p. 10.)

It would be necessary for the Coast Guard to institute some type of crew augmentation program to permanently increase cutter utilization substantially above their standard of 180 days annually for each cutter. Under an augmentation program the number of personnel assigned to each cutter would be increased to more than that required to operate the cutter. Part of the crew would remain ashore and periodically would replace crew members who had been on duty.

GAO's comparison of estimated costs of cutter operations with single and augmented crews showed that, on an annual basis, the single crew program now followed by the Coast Guard would be more economical. (See p. 14.) Because of inadequacies in the Coast Guard's cost accounting system, however, GAO is unable to state with any degree of certainty that the cost data included in this report is the same as that which would be developed by a sound and well-conceived cost accounting system. (See p. 15.) Moreover, the comparisons of costs under the two programs in this report can be significantly affected by future changes in the Coast Guard's high endurance cutter mission plan. (See p. 15.)

GAO believes that there are substantial intangible benefits, such as flexibility in scheduling missions; the integrity, morale, and training of the crew; and the value of a ship in being, which are associated with the Coast Guard's existing cutter utilization program. (See p. 24.) GAO believes that a decision as to whether the benefits of increased utilization of the cutter fleet are commensurate with the additional costs and the resulting impact on intangible factors can best be made by the Congress and Coast Guard.

Action taken by the Coast Guard to implement an effective cost accounting system should provide more reliable cost data with which to make effective cost comparisons of crewing alternatives. Also, the experience to be gained through the operation of an experimental weather station and icebreaker operations involving augmented crews will provide valuable data on the effects of augmenting on the morale and training of crews. (See p. 26.)

MATTERS FOR CONSIDERATION BY THE COMMITTEE

In view of the increasing cost of building high endurance cutters, GAO believes that the Committee may wish to suggest that the Coast Guard periodically evaluate the feasibility of augmenting crews for its high endurance cutter fleet. GAO believes also that a reevaluation of the feasibility of augmenting crews would be essential if substantial changes are made in the high endurance cutter mission plan. (See p. 26.)

CHAPTER 1

INTRODUCTION

Pursuant to the July 31, 1969, request of the Chairman, House Committee on Merchant Marine and Fisheries, and subsequent discussions with the Committee staff, the General Accounting Office has made a review of the U.S. Coast Guard's high endurance cutter fleet. In requesting our assistance, the Chairman furnished us a copy of the Coast Guard's position paper on their evaluation of large cutter operation toward maximum utilization. (See p. 32.)

As agreed with the Committee staff, we did not evaluate each item in the position paper but rather limited our examination to (1) a review of the utilization of the existing high endurance cutter fleet and (2) an evaluation of the feasibility of augmenting cutter crews to increase the annual utilization of high endurance cutters, thereby reducing the number of new cutters required to meet Coast Guard mission requirements. The scope of our review is set forth on page 27.

Missions carried out by the Coast Guard high endurance fleet include military readiness, aids to navigation, search and rescue, port security, law enforcement, oceanography, cadet training, and manning ocean stations. Cutters performing ocean station duty are primarily concerned with providing meteorological information, collecting oceanographic data, and furnishing aids to navigation information to air and marine traffic. The Coast Guard's policy is to utilize its high endurance cutters for ocean station duty and to assign them at regular intervals to other duty. To accomplish their missions the Coast Guard, using single crews, previously followed a maximum annual operating standard of 180 days at sea. Beginning in April 1967, this standard was increased to 210 days as a result of the commitment of cutters to Southeast Asia.

As of December 31, 1969, the Coast Guard's high endurance cutter fleet consisted of 35 cutters of four types: twelve 255-foot gunboats, eight 311-foot seaplane tenders, six 327-foot gunboats, and nine 378-foot Hamilton class

cutters. Of these cutters, 23 were assigned to the five Coast Guard districts of the Eastern Area Command (1st, 3d, 5th, 7th, and 8th) and 12 cutters were assigned to four of the five districts which constitute the Western Area Command (11th, 12th, 13th, 14th, and 17th). (See app. II.)

CHAPTER 2

HIGH ENDURANCE CUTTER UTILIZATION

Our review of Coast Guard records of the utilization of high endurance cutters during fiscal years 1966 through 1969 showed that, for fiscal years 1968 and 1969, the average operating time spent performing specific tasks was significantly greater than for previous years in both the Eastern and Western areas. This increase was attributable to the deployment of cutters to Southeast Asia. Also, during this 4-year period the average time reported for cutter maintenance increased in both the Eastern and Western areas.

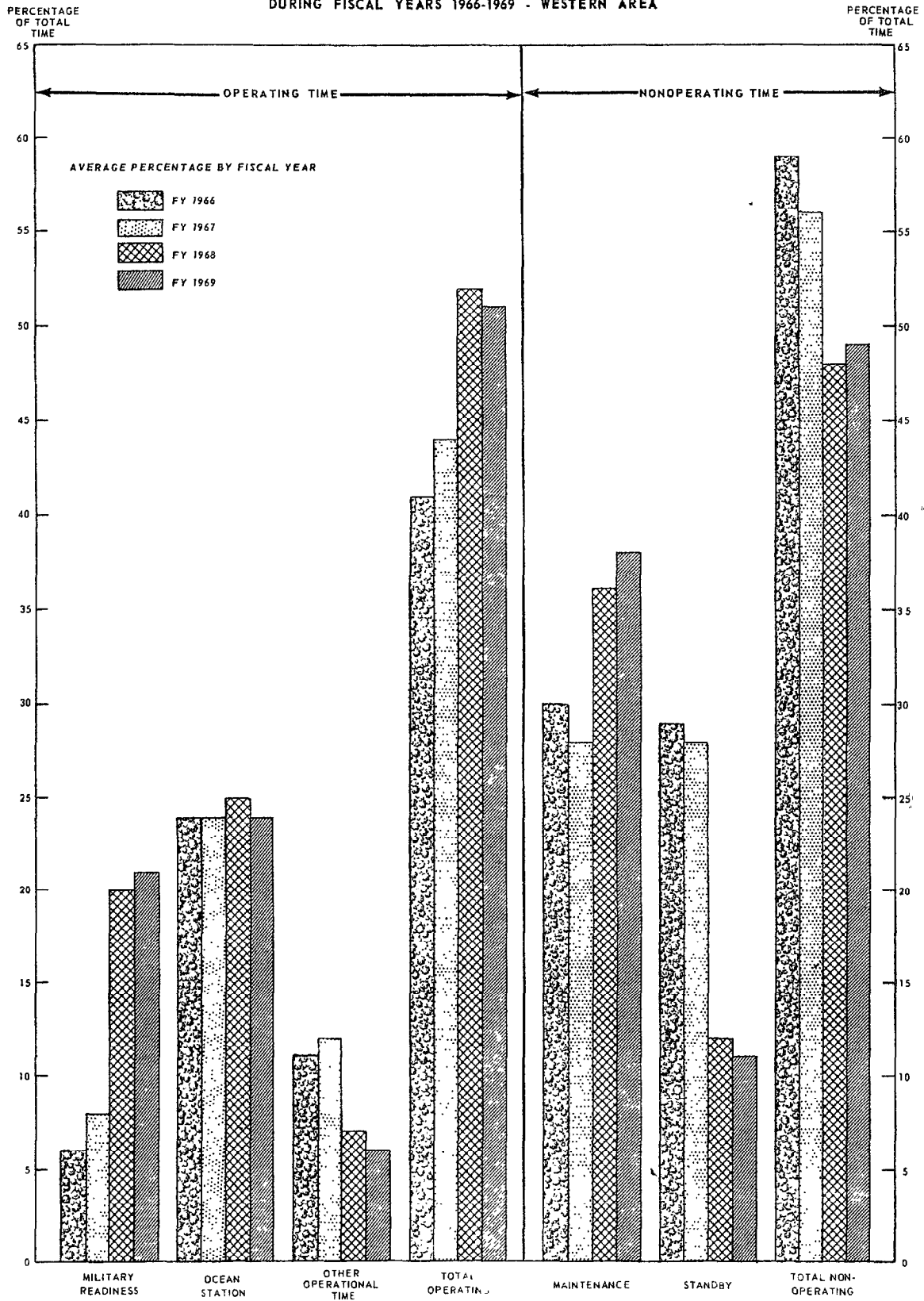
Our analysis of Coast Guard records showed that, for fiscal year 1969, the new 378-foot Hamilton class cutters were in an operational status an average of 39 percent of the time as compared with 50 percent for all other high endurance cutters. Our analysis showed also that maintenance time reported for both the new and old cutters was about the same.

UTILIZATION DURING FISCAL YEARS 1966 THROUGH 1969

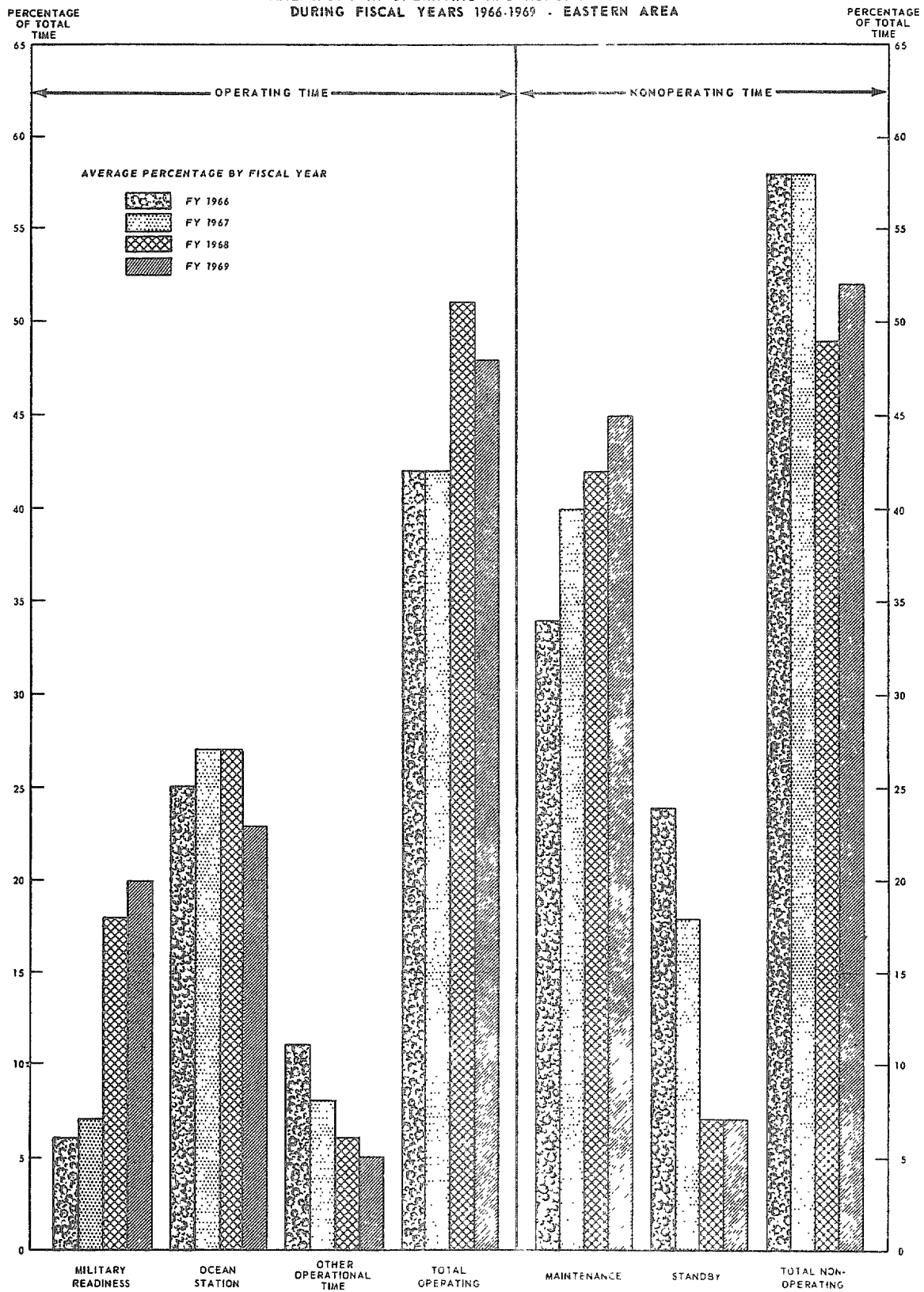
The charts on pp. 6 and 7 show for the Eastern and Western areas average annual utilization of high endurance cutters during fiscal years 1966 through 1969. These charts show also the total operating and nonoperating (standby and maintenance) time reported for cutters which completed 3 months of operations during a year. The category designated as "other operational time" includes law enforcement, search and rescue, reserve training, cadet training, aids to navigation, oceanography, and port security. The military readiness category includes time spent in Southeast Asia.

During the 4-year period, cutters in the Eastern area were in an operational status about 46 percent of the time whereas the Western area cutters averaged about 47 percent. Average operating times for both areas for fiscal years 1968 and 1969 were considerably higher than averages reported for fiscal years 1966 and 1967. This increase was a result of the deployment of cutters to Southeast Asia.

**COAST GUARD HIGH ENDURANCE CUTTERS
TIME SPENT IN OPERATING AND NONOPERATING STATUS
DURING FISCAL YEARS 1966-1969 - WESTERN AREA**



**COAST GUARD HIGH ENDURANCE CUTTERS
TIME SPENT IN OPERATING AND NONOPERATING STATUS
DURING FISCAL YEARS 1966-1969 - EASTERN AREA**



The commitment of cutters to support Southeast Asia operations started in April 1967 with the deployment of three cutters from the Eastern area and two from the Western area. A listing of cutters which operated in Southeast Asia from April 1967 to February 1970 is included as appendix III. After the deployment of cutters to Southeast Asia, the Coast Guard increased its annual maximum operating standard from 180 days to 210 days. However, the corresponding increase in mission requirements for the remaining cutters necessitated a cutback in the average utilization of cutters for law enforcement, search and rescue, and reserve training in both the Eastern and Western areas.

The average time that cutters were on standby decreased significantly during the 4-year period reviewed. Time provided by the decrease in standby was used for operations and maintenance. From fiscal year 1966 to fiscal year 1969, the average time reported for cutter maintenance increased from 34 percent to 45 percent in the Eastern area and from 30 percent to 38 percent in the Western area.

In response to our inquiry regarding the high percentage of maintenance time reported, the Coast Guard stated that this represented time which permitted unrestricted maintenance work to be done on the cutters. This maintenance classification provided the extra time to accomplish the increased maintenance workload caused by higher operating levels of the cutters and provided the crew with less restricted liberty while in port, a necessary morale factor resulting from the increased operations.

The Coast Guard has also pointed out that, because of the Southeast Asia commitment, cutters remain at sea longer and are exposed to the elements for longer periods of time without preventive maintenance. Cutters deployed to Southeast Asia also require 2 months of continuous maintenance prior to and subsequent to the military operation mission.

UTILIZATION OF HAMILTON CLASS CUTTERS

In 1964 the Coast Guard started a replacement program¹ to modernize its fleet of high endurance cutters. As of December 31, 1969, nine of the Hamilton class cutters had been received and placed in operation. Three additional cutters were under construction as of that date. The names of the nine cutters and the dates they were placed in operation are listed below.

<u>Hamilton class cutters</u>	<u>Date placed in operation</u>
HAMILTON (WHEC-715)	2- 5-68
DALLAS (WHEC-716)	5-14-68
MELLON (WHEC-717)	6- 9-68
CHASE (WHEC-718)	8-18-68
BOUTWELL (WHEC-719)	11-18-68
SHERMAN (WHEC-720)	2-22-69
GALLATIN (WHEC-721)	6- 5-69
MORGENTHAU (WHEC-722)	7-24-69
RUSH (WHEC-723)	12-23-69

According to the Coast Guard, the Hamilton class cutters provide the Coast Guard with a cutter far superior to the older cutters. (See p. 12.) Our review of fiscal year 1969 utilization data for the Hamilton class cutters showed that the average operating time of these cutters was considerably less than the average operating time for the older cutters. Also, in fiscal year 1969 the Hamilton class cutters showed an average of 43-percent maintenance time--the same as the older classes of cutters.

The chart on page 11 shows a comparison of the average operating and nonoperating time for the Hamilton class cutters with all other high endurance cutters for fiscal year 1969. The chart is based on the reported operations of cutters which were operational for at least one complete quarter during the year. The "shakedown" time (from date

¹The Coast Guard's Cutter Plan as revised sets forth its vessel replacement requirements.

of commissioning to date of commencing operations) for the Hamilton class cutters has been excluded from the comparison. The category "other operational time" includes the reported time for all missions other than military readiness and ocean station, and the category "standby" includes the reported time for all classifications of standby.

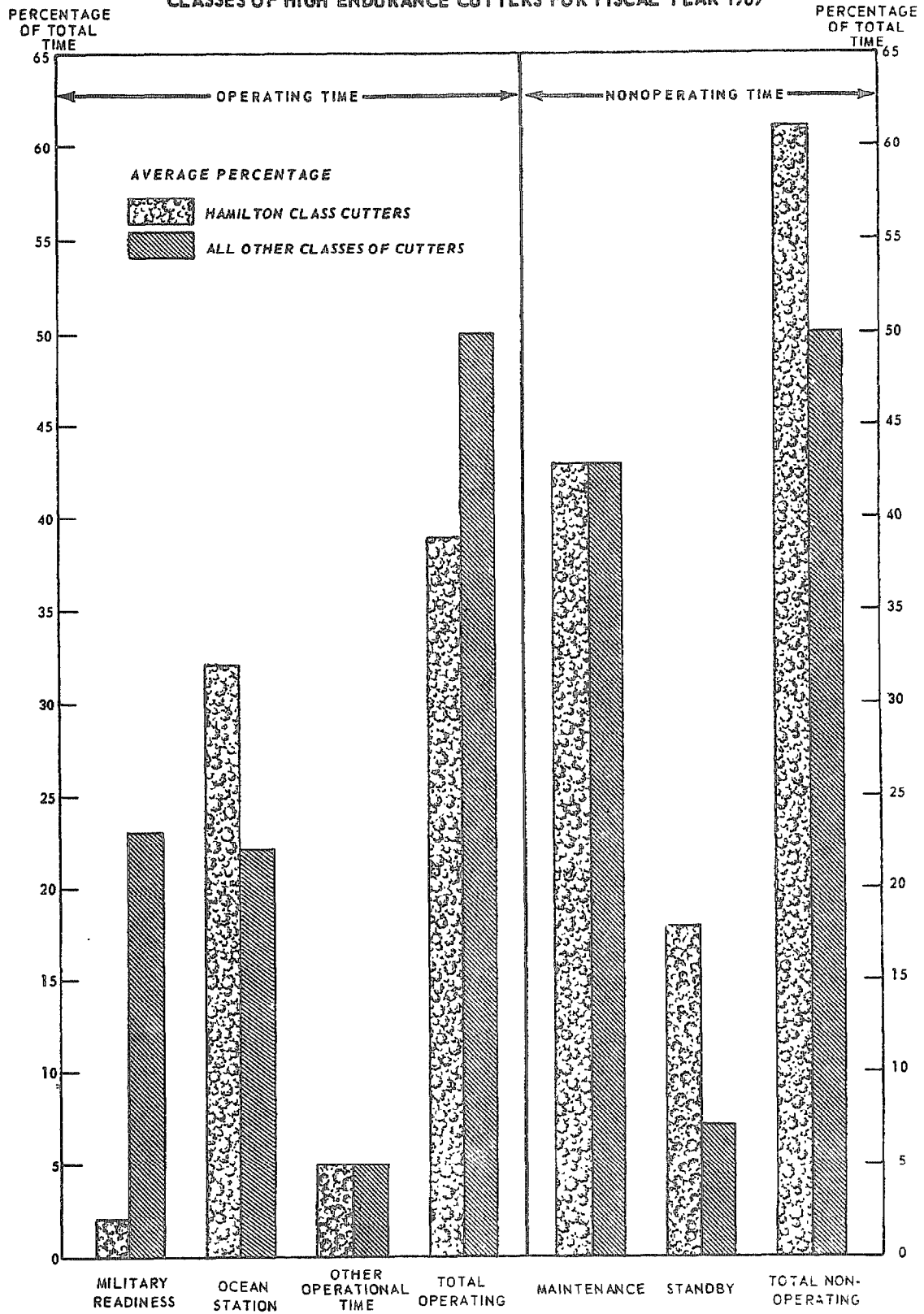
During fiscal year 1969, Hamilton class cutters were in an operational status, on the average, 39 percent of the time, whereas other cutters were in an operational status 50 percent of the time. However, the number of Hamilton class cutters available for operations during fiscal year 1969 was considerably less than the number of other cutters. During fiscal year 1969, six Hamilton class cutters completed one or more quarters of operations, whereas 30 cutters of other classes completed one or more quarters of operations.

The low average use of Hamilton class cutters for military readiness activities resulted from the deployment of other classes of cutters to Southeast Asia. The Hamilton class cutters had not been deployed to Southeast Asia at the time of our review.

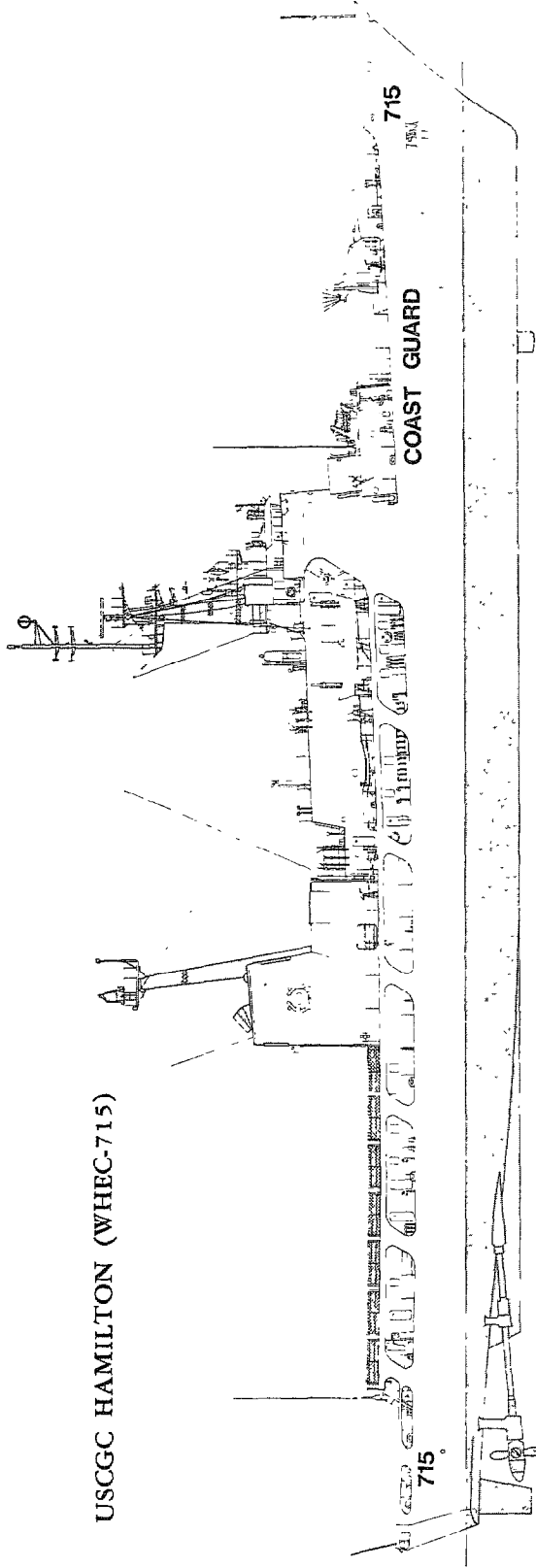
The average standby time for the Hamilton class cutters in fiscal year 1969 was 18 percent and the average for the other cutters was 7 percent. Coast Guard officials stated that the higher average standby time for Hamilton class cutters resulted from using these cutters primarily for the ocean station program. They explained that the ocean station program necessitated a large amount of standby time and, consequently, the Hamilton class cutters had a higher average standby time than the other cutters. Coast Guard officials pointed out, however, that a comparison of standby time for fiscal year 1970 would reveal a lower average standby time for the Hamilton class cutters because of the deployment of four of these cutters to Southeast Asia.

The chart shows that the average maintenance time for the Hamilton class cutters was the same as the average maintenance time for the older cutters. Coast Guard officials stated that, in their opinion, this was not

COMPARISON OF THE AVERAGE UTILIZATION OF COAST GUARD
HAMILTON CLASS HIGH ENDURANCE CUTTERS AND ALL OTHER
CLASSES OF HIGH ENDURANCE CUTTERS FOR FISCAL YEAR 1969



USCGC HAMILTON (WHEC-715)



Length, over-all	378 feet, 3 inches
Beam	42 feet
Draft	13 feet, 6 inches
Standard Displacement	2,748 tons
Full Load Displacement	3,050 tons
Complement	15 officers, 149 enlisted personnel
Engineering Plant	Two Fairbanks and Morse diesels Two Pratt and Whitney gas turbines One 350-horsepower bow thruster unit
Rated Speed (Diesels)	20 knots (7,000 horsepower)
Rated Speed (Gas Turbines)	29 knots (36,000 horsepower)
Cruising Range	12,000 miles at 20 knots
Armament	One 5-inch, 38-caliber single mount Two 81-mm mortars Two 50-caliber machine guns Two Mark 10 hedgehog projectors Two Mark 32 triple tube torpedo mounts

Line Drawing by William Clipson

unreasonable. They have pointed out that the equipment on the new cutters is much more sophisticated than the equipment on the older cutters and, therefore, requires much more maintenance. These officials have also stated that, after a new cutter is placed into operation, the "bugs" must be worked out of the systems; and, until additional operating experience is gained, large amounts of maintenance time will be reported for the cutter.

CHAPTER 3

ESTIMATED COSTS OF CUTTER OPERATIONS

WITH SINGLE AND AUGMENTED CREWS

In the position paper submitted to the Committee on Merchant Marine and Fisheries (see p. 33), the Coast Guard stated that the missions requiring high endurance cutters could be accomplished by using

- few cutters and many people or
- many cutters and few people.

The paper further stated that minimizing the number of people was the least costly method.

Prior to its involvement in Southeast Asia operations, the Coast Guard established a maximum vessel operations standard of 180 days a year. This standard, based on a 1966 Navy study, results in crew members being away from their homes and families for about 230 days annually because of repair and maintenance of the cutters away from home port and overnight watches in home port. The Coast Guard believes that it cannot require crewmen to be away from their families many more days than 230 and hope to retain them in the service. In our opinion, if the Coast Guard permanently increases cutter utilization substantially above the standard of 180 days and maintains the 230-day criterion for crew members, it would be necessary to institute some type of crew augmentation.

We made a comparison of costs to maintain and operate a fleet of new high endurance cutters utilizing single crews and augmented crews. Our comparison showed that the single crew program now followed by the Coast Guard would be more economical. However, uncertainties in the high endurance cutter mission plan and inadequacies in the Coast Guard financial management system presented problems in developing the data required to prepare valid comparative cost estimates.

PROBLEMS IN DEVELOPING COST COMPARISONS

In comparing cutter utilization costs under the two staffing levels, we were confronted with two basic problems: (1) uncertainties concerning future changes in the Coast Guard high endurance cutter mission plan and (2) the lack of reliable, adequate information on cutter operating costs and other estimated costs associated with crew augmentation programs.

High endurance cutter mission plan

At the Sixth North Atlantic Ocean Station Conference, held in 1968, it was agreed that the ocean station program would continue to be administered by the International Civil Aviation Organization through 1973. However, the conference requested the World Meteorological Organization, in cooperation with the International Civil Aviation Organization, to study the most economical means and ways by which meteorological data could be obtained after 1973.

Elimination of the ocean station program would have a significant effect on the high endurance cutter mission plan and the requirement for cutters. The Coast Guard could not furnish us with any information which would indicate the continuance or elimination of the program. In our cost computations we assumed that the ocean station program would continue during the foreseeable future.

Inadequacies in the Coast Guard financial management system

In a December 23, 1969, report to the Secretary of Transportation entitled "Need for Improvements in the Financial Management System of the U.S. Coast Guard" (B-115336), we pointed out several weaknesses in the Coast Guard's financial management system. These weaknesses included:

1. The need to improve cost accounting to provide better financial information for management through more accurate matching of the cost of resources used with time periods in which used.

2. The need to use certain generally accepted reporting and accounting techniques and standards in the preparation of reports.

The report pointed out that a financial management system which provides for the use of internal cost-based budgets, based on and used in conjunction with an accounting system that develops and reports cost data consistent with internal budgetary classifications, would greatly benefit the Coast Guard. This system would provide Coast Guard management with more useful information for evaluating the effectiveness, efficiency, and economy of its operations.

For accounting and reporting purposes, the Coast Guard considers the cost of items of equipment, components, accessories, and supplies as expenses at the time they are issued to or received by the using unit, rather than at the time they are actually used. Therefore, Coast Guard financial data represents accrued expenditure data--the value of goods and services received--rather than cost data--the value of goods and services used. In addition, the reported operating "cost," and the supporting "cost" accounts show, in some instances, general categories of cost rather than specific or meaningful segments of cost.

The following examples are typical of problems encountered during our compilation of cost data and are illustrative of deficiencies in the Coast Guard's accounting system.

1. Electronic maintenance--The Coast Guard informed us that for each cutter \$40,000 was budgeted for the annual electronic maintenance costs. However, our analysis of the reported electronic maintenance costs for the Hamilton class cutters during fiscal years 1967-1969 showed that the average cost was about \$64,000 for each cutter. In response to our inquiry as to the reason for the \$24,000 difference between the amount budgeted and the actual cost reported, the Coast Guard stated that reported cost probably included the cost of new equipment installed on the cutters at the U.S. Coast Guard Yard. The Coast Guard stated also that for analytical purposes it would be more reasonable to use \$40,000 as the annual recurring electronic maintenance cost.

2. Cutter maintenance--Cutter maintenance costs of \$561,036 were reported in fiscal year 1969 for the USCGC HAMILTON. We brought this matter to the attention of the Coast Guard because the HAMILTON's reported cost seemed high compared with the cost reported for other Hamilton class cutters. The Coast Guard subsequently informed us that a check of the HAMILTON's maintenance cost revealed that the cost was incorrectly reported. They further explained that the U.S. Coast Guard Yard had manufactured "kingposts" (equipment) for installation on all of the Hamilton class cutters and that the cost should have been distributed to all cutters receiving the equipment. The entire cost had been charged, however, to the HAMILTON since it was the first cutter to receive the equipment.

In response to our report on the need for improvements in the Coast Guard's financial management system, the Coast Guard in July 1970 promulgated changes in the system which should provide more meaningful operating cost data. These changes have not been fully implemented; and, in estimating the costs under the two staffing and utilization levels, we either adjusted the reported costs or used budgeted or standard amounts provided by the Coast Guard.

COST COMPARISONS

Under a program of crew augmentation, the number of personnel assigned to each cutter would be increased to more than that required to operate the cutter. Part of the crew would remain ashore and would periodically replace crew members who had been on duty. Thus the number of days at sea for each crewman would remain at or near the Coast Guard's established standard and the utilization of each cutter would be increased.

We estimated the costs associated with two programs for staffing and utilizing cutters--single crew program now used by the Coast Guard and a concept of 30-percent crew augmentation. The Coast Guard stated that it was completely practicable for high endurance cutters to operate 240 days a year and that this operation could be achieved with a 30-percent augmented crew. Coast Guard officials informally reviewed our procedure for the possible augmentation of the cutter crews and stated that the procedure seemed reasonable.

Our estimates were based on the assumption that the individual fleets would be composed entirely of new cutters of one basic configuration. A crew augmentation program could not be instituted with the present Coast Guard high endurance cutter fleet because of the advanced age of most of the cutters and the lack of cutter standardization within the fleet. The two programs for staffing and utilizing cutters are described below.

1. The single crew program--each of 33 cutters would operate 180 days annually or a total of 5,940 operational days a year and the program is based on the requirement of 33 cutters as stated in the Coast Guard Cutter Plan.

2. The 30-percent augmented crew program--each of 26 cutters would operate 240 days annually. This program would provide 6,240 operational days a year. It also considers cutter requirements of the Eastern and Western areas.

Because some Coast Guard officials expressed reservations to our 30-percent augmentation level, we also considered other plans with a higher percentage of personnel augmentation. Our estimates showed, however, that programs using a higher percentage of augmentation would result in higher estimated annual operating costs.

Our comparison of the estimated annual costs associated with the single crew program and the 30-percent augmentation program is as follows:

Comparison of Estimated Annual Costs
for Two Staffing Levels of High Endurance Cutters

	Single crew program (33 cutters)	30% crew augmen- tation program (26 cutters)
Cutter operating costs:		
Personnel	\$28,819,000	\$30,748,000
Fuel	4,488,000	4,706,000
Structure maintenance	17,000	13,000
Cutter maintenance	7,920,000	9,048,000 ^a
Electronic maintenance	1,320,000	2,246,000 ^a
Other	<u>46,000</u>	<u>47,000</u>
	<u>42,610,000</u>	<u>46,808,000</u>
Amortization of construction costs:		
Cutters	21,120,000	16,640,000
Shore facilities:		
Barracks, with galley, mess, and recreation facilities	-	744,000
Training classrooms	-	128,000
Training and test equipment	-	52,000
	<u>21,120,000</u>	<u>17,564,000</u>
Shore-support operating costs:		
Personnel	-	638,000
Maintenance, utilities, and other	-	1,089,000
	<u>-</u>	<u>1,727,000</u>
Estimated annual cost	<u>\$63,730,000</u>	<u>\$66,099,000</u>
Estimated annual added cost of augmen- tation program	<u>\$ -</u>	<u>\$ 2,369,000^a</u>

^aAssuming the augmentation resulted in increased cutter and electronic maintenance costs of one third rather than the rates suggested by the Coast Guard (see pp. 20 and 21), the respective costs would be \$8,320,000 and \$1,387,000. Under this assumption the resulting estimated added cost of the augmentation program would be \$782,000.

Our cost comparison shows that the estimated annual cost of the augmentation program would be greater than the estimated annual cost of the single crew program. The added costs under the augmentation program are attributable to the increased cutter operating costs and the cost of construction and operation of additional shore facilities. The source and nature of costs used in our comparison are discussed below.

Annual cutter operating costs

1. Personnel--the annual personnel cost for a single crew, based on the Coast Guard's personnel allowance and a standard personnel cost factor, totals about \$873,300 for each Hamilton class cutter. Personnel costs were increased under the 30-percent augmentation program to consider the additional crew required.

2. Fuel--the weighted average annual fuel cost for a Hamilton class cutter was about \$136,000. Under a single crew program there would be no change in the annual fuel cost. The slight increase under the augmentation program is attributable to the increased operating days.

3. Structure maintenance--these costs are associated with shore mooring and docking expenses, shore utilities, and automobile rentals and should not be significantly affected by an augmentation program.

4. Cutter maintenance--under a single crew program these costs were budgeted at about \$240,000 annually for each cutter. Due to the lack of reliable information on cutter maintenance costs, an acceptable rate of increase for this item was not determinable. In the absence of any other data on which to base an estimate of the cost of cutter maintenance, we used the percentage suggested by the Coast Guard which is presumably based on their experience in operating cutters. Coast Guard officials were of the opinion that, if utilization were increased one third, cutter maintenance costs would increase about 45 percent. If we assumed, however, that cutter maintenance costs increased one third instead of 45 percent, the results obtained under augmentation would be different. (See note a, p. 19.)

5. Electronic maintenance--under the present single crew program, the Coast Guard budgeted \$40,000 a cutter annually for this item. Coast Guard officials believe that a one-third increase in utilization would substantially increase the annual electronic maintenance cost and, also, decrease the useful life of the electronic equipment. In the absence of any other data on which to base our estimate of the cost related to electronic equipment, we used the data suggested by the Coast Guard Naval Engineering Division, which is presumably based on their experience with electronic systems on cutters.

The Naval Engineering Division provided us with data which indicated that, under an augmentation program, the annual recurring cost related to electronic equipment would be about \$86,400. This cost figure includes a one-third increase in electronic maintenance cost and additional cost factors based on earlier equipment replacement. However, assuming the useful life of the electronic equipment would not be affected by the increase in cutter utilization, the results obtained under augmentation would be different. (See note a, p. 19.)

6. Other cutter operating costs--these costs, averaging about \$1,400 annually, relate to administrative, recreation, and medical expenses for cutter crews. These costs should remain constant under a single crew program and increase as the number of days at sea is increased.

Amortization of construction costs

Cutters--in estimating annual amortization we used an average construction cost of \$16 million a cutter and an estimated useful life of 25 years. Coast Guard officials agreed that these assumptions were reasonable.

Shore facilities--under a single crew program where the crew is assigned to a cutter full time, barracks, galley, mess, recreation, and training facilities are not necessary because the cutter provides these services; however, under an augmentation program, these facilities must be provided for those crew members remaining ashore when the cutter is at sea. The following shore facilities were considered in our cost comparisons.

1. Barracks with galley, mess, and recreation facilities--according to the Coast Guard, recently constructed barracks, including galley, mess, and recreation facilities have cost about \$14,500 for each occupant. This includes the cost of the barracks, utilities, access roads, and landscaping. We estimate that the necessary barracks facilities for the augmentation program would cost about \$18.6 million to be amortized over a 25-year period.

2. Training facilities--the Coast Guard stated that crew members must be productively employed when ashore and that training should fulfill this requirement. In discussions with Coast Guard officials responsible for operations, we were informed that, under an augmentation program, there would be some consolidation of bases and that it would be reasonable to assume a minimum of eight locations in our estimates. The Coast Guard estimated a cost of \$400,000 for a classroom facility which would be adequate for training approximately 101 men. This cost is a compromise between the bare essentials and a highly technical facility such as an engineman's school. The cost of training facilities would be substantially greater if crew members receive highly technical training during their tours ashore.

We estimate that the necessary training facilities for the augmentation program would cost about \$3.2 million to be

amortized over a 25-year period. The Coast Guard stated that the cost of training facilities would be greater than the estimated amounts used in our comparisons.

3. Training and test equipment--under an augmentation program this equipment would be needed for electronics repair and training. The Coast Guard informed us that, in order to allow electronics technicians reasonable time with their families and still maintain capable personnel, they would have to conduct a comprehensive training program at the cutter home ports.

The Coast Guard estimates that the necessary training and test equipment for an augmentation program would cost about \$65,000 for each of the eight ports to be amortized over a 10-year period. Because of the shorter periods in port under a crew augmentation program, some equipment could not be repaired aboard the cutters as is done under the existing single crew program. Spare equipment would be prepositioned at the home ports to replace defective equipment on the cutters; defective equipment would be repaired ashore.

Annual shore-support operating costs

To provide proper support for crew members ashore, it would be necessary to provide additional shore-support personnel to maintain and operate the shore facilities. The additional personnel required would include commissarymen, stewards, stewardsmen, storekeepers, yeomen, and training instructors. Coast Guard officials stated that crew members assigned ashore could be used to provide support services; however, permanently assigned personnel would be needed for continuity and accountability of operations. Also, the Coast Guard estimated that the annual shore facility maintenance and operations costs would average about five percent of the \$21.8 million total shore facility construction costs.

INTANGIBLE FACTORS

Coast Guard officials pointed out that there are certain intangible factors and advantages associated with the single crew high endurance cutter program. Among the factors

mentioned were (1) flexibility of mission scheduling, (2) the integrity, morale, and training of the crew, and (3) the value of a ship in being. Coast Guard officials also stated that quantifiable data concerning the effect of augmented crew operations on crew morale and training was not available.

Although we believe that the intangible factors in favor of the single crew program are important and should be considered in evaluating the feasibility of crew augmentation programs, we cannot evaluate the impact of these factors because of the lack of quantifiable data.

As part of a program being conducted by the Environmental Science Services Administration and the Weather Bureau, the Coast Guard has been assigned the responsibility of providing and operating a weather station in the Atlantic Ocean about 200 miles east of Norfolk, Virginia. This program, instituted in February 1970, should provide the Coast Guard with valuable data concerning the effects of augmented cutter operations on crew morale and training.

The weather station, designated Ocean Weather Station Hotel, has the primary mission of monitoring and reporting surface and upper air weather phenomena. To carry out this assignment, the Coast Guard modified a 311-foot cutter, the GRESHAM, by removing some of its regular equipment and installing special meteorological equipment. Utilizing the GRESHAM continually for 240 days to carry out this assignment, plus 2 additional months of standby in its home port, would exceed both the personnel and material limitations of the GRESHAM. Therefore, the GRESHAM'S basic crew has been augmented by 25 percent to alleviate the hardships imposed upon the cutter's crew.

Although the operation of the GRESHAM is of a single mission nature, rather than a multimission nature as are the operations of high endurance cutters, the Coast Guard believes that valuable information concerning the impact of augmented crews upon crew morale and training will be generated by this project. Also, the Coast Guard believes that additional data on crew morale and training will be obtained from augmenting crews on Coast Guard icebreakers.

CHAPTER 4

CONCLUSIONS AND MATTERS FOR CONSIDERATION BY THE COMMITTEE

CONCLUSIONS

We conclude that increased utilization of the high endurance cutter fleet is possible. In fiscal years 1968 and 1969 the Coast Guard demonstrated that increased utilization could be achieved. However, if the Coast Guard determines that, from the standpoint of crew endurance and morale, it is not desirable to continue operating above the 180-day standard, the means to increased utilization are limited.

Our comparison of two staffing programs for high endurance cutters showed that by augmenting cutter crews and reducing the number of cutters, increased utilization of the fleet could be attained. Our comparison of the estimated costs associated with these staffing levels showed that, on an annual basis, the single crew program now followed by the Coast Guard would be more economical. However, because of the Coast Guard's inadequate cost accounting system, we are unable to state with any degree of certainty that the cost data included in our report is the same as that which would be developed by a sound and well-conceived cost accounting system. Also, our comparison can be significantly affected by future changes in the Coast Guard high endurance cutter mission plan.

In considering the desirability of augmented crews for cutters, there are also certain intangible benefits associated with the Coast Guard's existing single crew program. According to the Coast Guard, these benefits include flexibility in scheduling missions; integrity, morale, and training of the crew, and the value of a ship in being. We believe, however, that a decision whether the benefits of increased utilization of the cutter fleet are commensurate with the additional costs and the resulting impact on intangible factors can best be made by the Congress and Coast Guard.

Action taken by the Coast Guard to implement an effective cost accounting system should, in the future, provide more reliable cost data with which to make effective cost comparisons of augmented and single crew high endurance cutter operations. Also, in this regard, the experience to be gained through the operation of Ocean Weather Station Hotel and icebreaker operations involving augmented crews will also provide valuable data on the effects of augmenting on crew morale and training.

MATTERS FOR CONSIDERATION BY THE COMMITTEE

In view of the increasing cost of constructing high endurance cutters, we believe the Committee may wish to suggest that the Coast Guard periodically evaluate the feasibility of augmenting crews for its high endurance cutter fleet. A reevaluation of the feasibility of augmenting crews would be essential if substantial changes are made in the high endurance cutter mission plan.

CHAPTER 5

SCOPE OF REVIEW

We reviewed pertinent cutter utilization regulations, abstracts of cutter operations, operating cost information, cutter construction contracts, and other available information and documentation. We also held discussions with appropriate Coast Guard officials.

We did not analyze or evaluate the missions carried out by the cutters or the role of the cutters in the overall national defense plan.

Our review was made at U.S. Coast Guard Headquarters, Washington, D.C.

APPENDIXES

NINETY-FIRST CONGRESS

EDWARD A. GARMATZ, MD., CHAIRMAN	
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RICHARD N. SHAPCO
MINORITY COUNSEL

House of Representatives, U.S.
Committee on
Merchant Marine and Fisheries
Room 1334, Longworth House Office Building
Washington, D.C. 20515

July 31, 1969

ROBERT J. MCELROY, CHIEF CLERK

B-1 851

Hon. Elmer B. Staats
Comptroller General
General Accounting Office
Washington, D. C. 20548

Dear Mr. Staats:

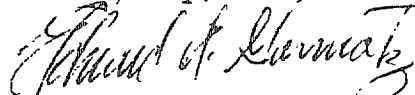
In the report on the 1970 Coast Guard Authorization Bill submitted by the Committee to the House, a paragraph is included which suggests the possibility of greater utilization of new large coast guard cutters over and above the present 180-day norm.

The Position Paper submitted by the Coast Guard in response to the suggestions, sets forth the view that greater utilization is not practicable in the light of circumstances surrounding the use of the vessels.

In view of the fact that it is probable that for at least 10 years from the commissioning of a new vessel, relatively little repairs or maintenance will be required, as compared with the vessels replaced, it would appear that the free time thus obtained could be advantageously used with a view toward a reduction in the total number of new vessels required to meet Coast Guard missions.

It is requested that you examine the Position Paper submitted by the Coast Guard in this respect, a copy of which is attached hereto, and let me have the benefit of your advice.

Sincerely,



Edward A. Garmatz
Chairman

June 1969

POSITION PAPER

EVALUATION OF LARGE CUTTER OPERATION TOWARD MAXIMUM UTILIZATION

Problem Definition:

The problem is set forth in Report No. 91-144 of the House of Representatives, 91st Congress, 1st Session, Coast Guard authorization, dated 1 April 1969:

"In the course of the hearings, the Coast Guard indicated that it believed that its aim of maintaining its large vessels at sea for 180 days per year was reasonable, pointing out that, among other things, considerable time was required to provide needed maintenance. While unquestionably many of the old vessels require long periods for repairs to keep them operating for some further time, it would appear that the new large cutters would not require major work for many years to come. Under the circumstances, it would appear that they could be scheduled to spend considerably more time at sea, possibly as much as modern merchant vessels. As the cost of vessel replacements continues to increase, with the present large cutters averaging over \$14 million each, increased utilization of each vessel becomes increasingly important in the interest of minimizing costs. It is urged that the Coast Guard study the problem with a view toward getting maximum use of each vessel, thus decreasing the total number required for performance of its missions."

Background:

The Coast Guard is vitally concerned with improving the use of all resources in the performance of its varied missions. Regarding High Endurance Cutters, a study of utilization was done in 1959 and updated in 1962 in connection with the preparation of "A Report on the Requirements for Coast Guard Vessels." A review was again conducted in 1965 to further clarify projected future use of High Endurance Cutters and define utilization standards. Further analysis was undertaken in 1968 to determine more precisely the effects of our current Southeast Asia operation on our High Endurance Cutters.

When comparing operating time of High Endurance Cutters and merchant ships, many factors come into play. These make what might appear on the surface to be two similar operations actually identifiable as two quite unrelated or uncomparable operations. The more important factors are: physical plant endurance, crew endurance, habitability at sea, type of operations for which employed, requirements for backup, and personnel training. These will be examined in some detail.

In an economic sense a capital investment, such as a vessel, is fully justified when it is utilized to a maximum degree. Maximum utilization in the case of a modern merchant vessel is normally governed by

materiel limits, product demand, and voyage scheduling. The availability of crewmen is normally assumed as a precondition to the investment decision. Ideally, employment of the vessel will be constrained only by maintenance requirements.

Endurance:

In the ideal case where maintenance is the only constraint on utilization, vessels could be employed about 300 to 330 days annually. Ocean-going merchant marine ships are utilized between 241 to 293 days annually according to a recent National Academy of Science study. The same study shows that the average work year for licensed officers and unlicensed work force is between 143 and 150 days. An informal crew rotation permits the high ship utilization level. In effect, this accomplishes the same result as the shift operation in a manufacturing plant.

When for any reason (e.g., breakdown, no cargo, etc.) less than maximum operation is forced on the owner, losses are minimized by employee reductions. Similarly, possession of necessary skills is a prerequisite to employment; work force retention for training in the industry is therefore largely avoidable.

A major obstacle to complete adoption of industry practice relates to the nature of the Coast Guard work force. Industry has the option of quick expansion or contraction in response to demand by drawing from a manpower pool not constantly on the payroll. The Coast Guard cannot do this because an enlistment contract binds the Coast Guard to certain expenses without regard to how the man's time is utilized. The 180 day goal mentioned in the hearing is a compromise between what the man can be expected to endure and what the ship can endure. Total annual time away from home and family for the man will be about 230 days. The typical higher rated Coastguardsman, as in most walks of life, is married. The service simply cannot require him to be away from his family many more days than this, and hope to retain him in the service.

One alternative to increase Coast Guard vessel utilization is rotation of personnel between sea and shore assignments. However, to a great extent, this is not feasible because skill requirements are not completely interchangeable. Typifying the problem is aviation which is virtually entirely shore based and can employ few seagoing skills. Another alternative is the double crewing method used for the missile submarine fleet, but here cost becomes a great problem. There are many more personnel to be trained, paid, and housed. Substantial facilities ashore are necessary to house the part of the crew not operating the ship, and to afford support normally provided by the crew when standing by for mission operation. The missions requiring high endurance cutters can be accomplished by using few ships and many people, or many ships and few people. Calculation considering all costs shows that the least costly way is to minimize the number of people, and in this we are making progress by utilization studies, advances in technology, and research and development.

Habitability of Ships at Sea:

The Coast Guard takes a great deal of pride in the degree of habitability it has been able to provide personnel in the Hamilton Class Cutters. This level of habitability far exceeds any that the Coast Guard has been able to provide in ships in the past. It is, however, not comparable to habitability of modern merchant ships. Large merchant vessels are relatively stable platforms at sea, and have the necessary deck space to permit stateroom types of accommodations for most of the crew. Smaller Coast Guard ships carrying larger numbers of personnel still must assign an average of 30 enlisted personnel to a berthing compartment. These berthing areas are divided by partial partitions which give some degree of privacy, but cannot be compared to a private stateroom.

Type of Operations for Which Employed:

Like the industry, the majority of Coast Guard High Endurance Cutter operations lend themselves to scheduling. To the extent Coast Guard operations are predictable, industry approaches are employed to assure fuller utilization. However, differences remain.

A merchant vessel which is employed for a single purpose as, for example, shuttling cargo between two points can generally be planned to operate at all times when not required to be in a shipyard. Mechanical breakdowns, delays due to weather and other factors only result in a delay in the completion of the trip. Barring the total loss of a vessel, the trip, however, will be completed. This type of operation is typically represented by tank ships shuttling fuel from production points to consumer points, and by container ships.

When a ship is employed on a multimission basis, this is no longer true. If a delay occurs while the ship is performing Task A, and it is scheduled to perform Task B later, not only does this delay affect the completion of Task A, but it may also delay or cause the cancellation of Task B. (This can be avoided if there is an alternative means of performing Task B, as scheduled, without the use of the first ship.) Additionally, lapses are inherent in a multimission operation because Task A is often completed before Task B commences, resulting in a period during which there is no planned operation of the vessel. This situation occurs in Coast Guard operations. However, the time between tasks is not lost. The Coast Guard operates scheduled missions such as ocean stations as well as missions which cannot be scheduled, but for which vessels must be maintained in a state of readiness. The Search and Rescue mission is the primary example of this latter type of operation. By very careful scheduling of planned tasks, it is almost always possible to have available vessels for which no activity is scheduled but which are operationally ready to proceed to answer unscheduled Search and Rescue calls or conduct Law

Enforcement operations. This time, therefore, contributes to the total operational performance of the Coast Guard. Although the planned or scheduled operations claim a lower number of days per year of operation than is typical of many merchant ships, the total of scheduled operations and standby time set aside for unscheduled operations actually approaches a high level of utilization.

To relate this situation to one more familiar, one must inquire as to whether proper utilization is being obtained from the community fire engine this year because it was only called out to 6 fires. Standby time becomes a valid utilization factor.

Requirements for Backup to Insure Reliability of Operations:

As a further consequence of being on call, the availability of these unscheduled vessels also provides the backup for the performance of the scheduled operations in the event of a casualty or other delay incurred by a ship which has been scheduled for these operations. This backup requirement is an essential part of Coast Guard operations to insure the fulfillment of a mission, and is, of course, a requirement not found in commercial operation.

Personnel Training Requirements:

The complexity and amount of installed equipment on High Endurance Cutters requires operating personnel of considerably different training and experience than those found operating vessels in commercial operations. Extensive periods of training are required to make the individual a useful member of the ship's complement. To maintain the capability of the Cutter in a state as it was originally designed, continued training while aboard a unit is essential. Occasionally, in addition to these types of training, advanced or higher levels of specialized training are also required after personnel have had their initial training and some experience. The investment in these training requirements is such that personnel must be retained aboard a ship for extended periods of time in order to achieve the benefit of the training. The normal tour of duty on High Endurance Cutters is two years. This tour of duty is an obligation in contrast to the voluntary tour of the merchant mariner. In the Coast Guard, personnel receiving these high levels of training will frequently serve more than one tour of duty on a similar type of assignment, thereby yielding additional benefit to the service from the original training.

The requirement for leave and time off duty in homeport for personnel serving extended tours on vessels is obviously much higher than the similar requirement for many a merchant mariner who may make one or two voyages and then seek other employment ashore for a period of time before returning to sea. Of course, the merchant mariner also receives much higher pay and a much longer vacation than Coast Guard personnel. Retention of personnel for more than one enlistment may be

jeopardized by requiring repeated tours aboard vessels operating with such frequency as to reduce leave and time off to unacceptable levels. What is unacceptable is determined by the personnel who can choose to leave the service at the end of their enlistment. Thus, the failure to retain trained, experienced personnel will increase costs and reduce operational effectiveness.

Conclusion:

The factors that influence the use of a High Endurance Cutter are complex, interrelated, and may change rapidly with changing conditions. These factors are continually under review resulting in adjustments to operating schedules and operating policies as necessary to maintain a balance and insure effective use of these ships. It is interesting to note that, due to the use of High Endurance Cutters in Southeast Asia, absence from homeport in FY 1970 of the 23 High Endurance Cutters now homeported on the Atlantic Coast will approximate 230 days. Preplanned maintenance time in homeport of 58 days brings the total of scheduled activities to an average of 288 days per ship. It is not intended to continue this level of operation as a standard, however, because it so strains crew endurance.

Thus, in satisfying the peacetime crew endurance constraint, we have a built-in contingency capability which amounts to almost four peacetime ship-years for every three High Endurance Cutters in the fleet by simply shifting to a wartime deployment schedule of 230 operating days. Such a shift is possible vis-a-vis the crew endurance factor since it would be used only under wartime or wartime-like conditions when human resource factors are subordinated to the more important national objective.

HIGH ENDURANCE CUTTER ASSIGNMENTS

DECEMBER 31, 1969

EASTERN AREA DISTRICTS

<u>Name of cutter</u>	<u>Type</u>	<u>Length (in feet)</u>	<u>Year built</u>
1st DISTRICT:			
Boston, Mass.:			
ESCANABA	WPG, gunboat	255	1946
COOK INLET	WAVP, seaplane tender	311	1944
CASTLE ROCK	do.	311	1944
YAKUTAT (note a)	do.	311	1942
BIBB	WPG, gunboat	327	1937
CAMPBELL	do.	327	1936
DUANE	do.	327	1936
BOUTWELL	WHEC, high endurance cutter	378	1968
CHASE	do.	378	1968
HAMILTON	do.	378	1967
SHERMAN	do.	378	1968
3d DISTRICT:			
New York, N.Y.:			
OMASCO	WPG, gunboat	255	1946
SPENCER	do.	327	1936
DALLAS	WHEC, high endurance cutter	378	1967
GALLATIN	do.	378	1968
MORGENTHAU	do.	378	1969
5th DISTRICT:			
Portsmouth, Va.:			
MENDOTA	WPG, gunboat	255	1946
ABSECON	WAVP, seaplane tender	311	1942
CHINCOTEAGUE	do.	311	1942
MC CULLOCH	do.	311	1943
INGHAM	WPG, gunboat	327	1936
7th DISTRICT:			
Miami, Fla.:			
ANDROSCOGGIN	do.	255	1946
8th DISTRICT:			
New Orleans, La.:			
SEBAGO	do.	255	1945

APPENDIX II

Page 2

HIGH ENDURANCE CUTTER ASSIGNMENTS

DECEMBER 31, 1969

WESTERN AREA DISTRICTS

<u>Name of cutter</u>	<u>Type</u>	<u>Length (in feet)</u>	<u>Year built</u>
11th DISTRICT:			
Long Beach, Calif.:			
MINNETONKA	WPG, gunboat	255	1945
PONTCHARTRAIN	do.	255	1945
12th DISTRICT:			
San Francisco, Calif.:			
GRESHAM	WAVP, seaplane tender	311	1943
TANEY	WPG, gunboat	327	1936
RUSH	WHEC, high endurance cutter	378	1969
13th DISTRICT:			
Seattle, Wash.:			
KLAMATH	WPG, gunboat	255	1946
WACHUSETT	do.	255	1946
WINONA	do.	255	1946
14th DISTRICT:			
Honolulu, Hawaii:			
CHAUTAUQUA	do.	255	1945
WINNEBAGO	do.	255	1945
BERING STRAIT (note a)	WAVP, seaplane tender	311	1944
MELLON	WHEC, high endurance cutter	378	1967

^aOn February 1, 1970, the Coast Guard announced that the USCGC YAKUTAT and USCGC BERING STRAIT would be turned over to the Navy of the Republic of South Vietnam as part of the Vietnamization program.

NOTE: As of December 31, 1969, three additional 378-foot WHEC, high endurance cutters were under construction at Avondale Shipyards, Incorporated, New Orleans, Louisiana.

LIST OF HIGH ENDURANCE CUTTERS
DEPLOYED TO SOUTHEAST ASIA

FROM APRIL 1967 TO FEBRUARY 1970

	Estimated	
	home port	return date
<u>Name of cutter</u>	<u>departure date</u>	<u>return date</u>
GROUP I:		
USCGC BARATARIA	4- 1-67	1-31-68
USCGC HALF MOON	4- 1-67	1-31-68
USCGC YAKUTAI	4- 1-67	1-31-68
USCGC BERING STRAIT	4-26-67	2-25-68
USCGC GRESHAM	4-16-67	2-15-68
GROUP II:		
USCGC DUANE	10-30-67	8-29-68
USCGC ANDROSCOGGIN	11- 3-67	9- 2-68
USCGC CAMPBELL	11-13-67	9-12-68
USCGC MINNETONKA	12-17-67	10-16-68
USCGC WINONA	1- 5-68	11- 4-68
GROUP III:		
USCGC BIBB	6- 5-68	4- 4-69
USCGC INGHAM	6-16-68	3-15-69
USCGC OWASCO	6-21-68	4-20-69
USCGC WACHUSETT	8-21-68	6-20-69
USCGC WINNEBAGO	9-20-68	7-19-69
GROUP IV:		
USCGC SPENCER	1-12-69	11-11-69
USCGC MENDOTA	1-28-69	11-27-69
USCGC SEBAGO	1-31-69	11-30-69
USCGC TANAY	4-25-69	2-24-70
USCGC KIAMATH	6- 4-69	(a)
GROUP V:		
USCGC DALLAS	9-11-69	(a)
USCGC HAMILTON	8-21-69	(a)
USCGC CHASE	9- 8-69	(a)
USCGC MELLON	1-11-70	(a)
USCGC PONTCHARTRAIN	2- 5-70	(a)

^aDeployed as of February 28, 1970.