108352

REPORT BY THE U.S.

General Accounting Office

The 140-Foot Harbor Tugboat: Does The Coast Guard Need It On The East Coast?

The Coast Guard is planning to spend about $35 million to buy five 140-foot multi-mission domestic icebreakers for operations on the east coast of the United States. The need for a vessel of the size and icebreaking capability of this new craft is questionable on the east coast. GAO recommends that the Coast Guard reevaluate its overall east coast mission and match it with a vessel which will satisfy the mission need.

PSAD 79-17
JANUARY 15, 1979

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

PROCUREMENT AND SYSTEMS
ACQUISITION DIVISION

GAO220

B-114851

A6C29

The Honorable Brock Adams
The Secretary of Transportation

Dear Mr. Secretary:

This report discusses the Coast Guard's procurement of 140-foot harbor tugboats and questions its plans to use five of these new vessels on the east coast in the 1st, 3d, and 5th Districts.

This review was made as part of our ongoing review of major acquisitions of executive agencies. Coast Guard personnel, with whom we discussed this report, agreed that it presented a fair discussion of the facts and concurred with our conclusions and recommendations.

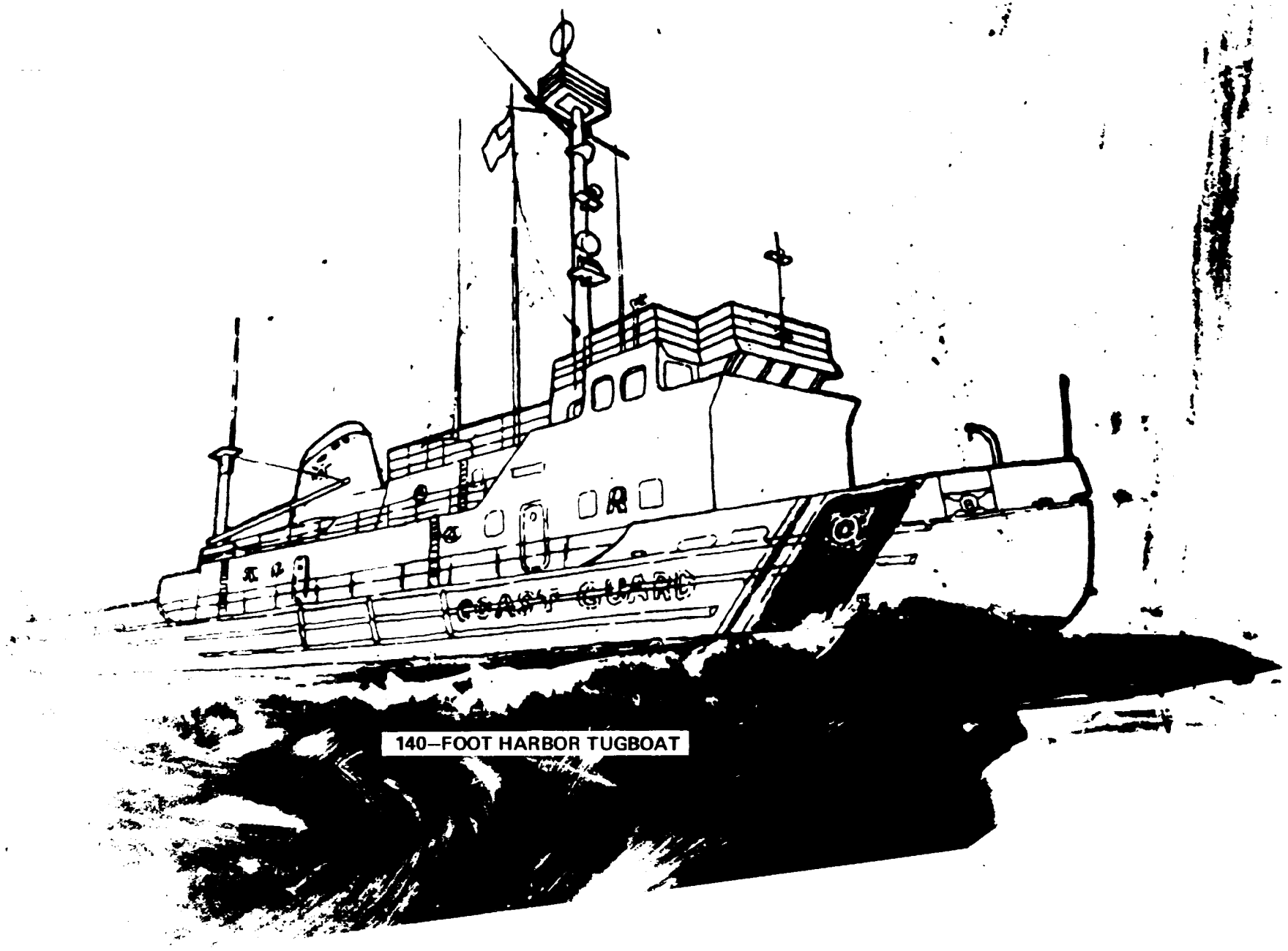
This report contains a recommendation to you on page 9. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Director, Office of Management and Budget, and the Commandant, U.S. Coast Guard.

Sincerely yours,

J. H. Stolarow

J. H. Stolarow
Director



140–FOOT HARBOR TUGBOAT

GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARY
OF TRANSPORTATION

THE 140-FOOT HARBOR TUGBOAT: DOES THE COAST GUARD NEED IT ON THE EAST COAST?

D I G E S T

The Coast Guard is planning to buy 10 or 11 new 140-foot harbor tugboats at an estimated total cost of about $70 million to replace its existing fleet of 13 aging 110-foot harbor tugboats. The Coast Guard uses these 110-foot harbor tugboats for icebreaking duties on the Great Lakes and on the rivers and harbors of the east coast, from Maine to the Chesapeake Bay. Five are on duty in the Great Lakes district, and eight are divided among three east coast districts.

Although these vessels are designated as harbor tugboats, they are really multipurpose craft with reinforced hulls for icebreaking purposes. Over the years, these 110-foot tugs have become the key domestic icebreakers in the Coast Guard's fleet. (See p. 1.)

Because the existing 110-foot harbor tugboats are too old, too costly to maintain, not very habitable, and marginally seaworthy, the Coast Guard is purchasing the new 140-foot harbor tugboats. (See p. 3.)

OPERATIONAL REQUIREMENTS NOT DEFINED

In GAO's opinion, one weakness in the Coast Guard's approach to replace the existing 110-foot harbor tugboats is the decision to design a single replacement craft. Because Great Lakes and east coast missions, use, operating constraints, and thus design characteristics are quite different, the Coast Guard should have established two separate operational requirements. Coast Guard participants in a 1973 domestic icebreaking symposium commented on this specific point. They observed that not one, but two types of replacement vessels were needed to replace the aging 110-foot fleet: one vessel for the Great Lakes and possibly Alaska and another for the east coast districts. (See p. 4.)

PSAD-79-17

Despite clear indications that two separate requirements were necessary, the Coast Guard chose to design one type of vessel to fulfill both requirements. Furthermore, in establishing its design constraints, the Coast Guard chose to design for the more critical Great Lakes icebreaking requirements. This new vessel is, in GAO's opinion, overpowered for east coast operations. Additionally, the size of the new vessels (length and draft) could cause problems because of the geographical constraints of east coast operating areas. (See pp. 6 and 7.)

The first five tugs, which are in the process of being built or are under contract, will go to the Great Lakes. The sixth tug, also under contract, is not currently assigned; but its use as an additional Great Lakes support vessel is being studied by the Coast Guard. The Coast Guard then intends to request funds to build five additional vessels to replace the east coast tugs. (See p. 9.)

The Coast Guard cannot justify its plans to put five of these vessels on the east coast. Use of existing craft does not justify the additional capability of the replacement vessel since east coast operations require a tug more than an icebreaker. In GAO's opinion, the 150-percent increase in shaft horsepower of the 140-foot vessel is clearly excessive for these districts. (See p. 9.)

To procure these vessels for east coast operations would be a waste of both capital investment and operating expense funds. It is difficult to quantify the potential cost of this action in either capital investment or operating expense funds. However, one 1974 Coast Guard design comparison estimated that a 140-foot vessel could cost as much as $1 million more than a 120-foot vessel to design and build. (See p. 9.)

RECOMMENDATION

GAO recommends that the Coast Guard reevaluate its plans to replace existing east coast harbor tugboats with the 140-foot craft. The Coast Guard should consider

(1)--the overall east coast mission of the 110-foot tugs as well as any other class of vessel currently requiring replacement,

(2)--the potential for consolidating the mission of the 110-foot tug and other aging east coast vessels into a requirement for a single multimission vessel, and

(3)--the life-cycle costs of various alternative designs in selecting a replacement vessel which will satisfy the mission need. (See p. 9.)

Tear Sheet

Contents

CHAPTER 1

INTRODUCTION

The Coast Guard is planning to buy 10 or 11 new 140-foot harbor tugboats at an estimated total cost of about $70 million to replace its fleet of 13 aging 110-foot harbor tugboats. The Coast Guard uses these 110-foot harbor tugboats for icebreaking duties on the Great Lakes and on the rivers and harbors of the east coast, from Maine to the Chesapeake Bay. Five are on duty in the Great Lakes district, and eight are divided among three east coast districts.

Although these vessels are designated as harbor tugboats, they are really multimission craft with reinforced hulls for icebreaking purposes. Over the years, these 110-foot tugs have become the key domestic icebreaker in the Coast Guard's fleet. Although they were not specifically designed as icebreakers, they do have a significant icebreaking capability. Icebreaking operations, however, are not their only, or in many cases even their main, mission. Icebreaking is the main mission by far of the five craft assigned to the Great Lakes. However, the eight vessels assigned to the east coast districts perform many other missions, such as search and rescue, port security, law enforcement, and environmental protection. They are also capable of doing standard tug duties, such as towing vessels and pushing barges. In the three east coast districts, time spent on other duties generally exceeds the time spent on domestic icebreaking missions.

The Coast Guard has anticipated the replacement of these 110-foot harbor tugboats since at least the early 1970s. It believes they should be replaced because they are too old and uneconomical to operate.

PROCUREMENT METHOD

The Coast Guard considered various alternative methods of acquisition and eventually decided on a competitive bid by commercial boatyards. A multiyear contract award was favored because it permitted the Coast Guard to obtain from two to four 140-foot vessels. Although the agency had in early 1976 what it considered a firm requirement for five replacements, it was not sure what funds would be available nor the probable cost of each ship.

In May 1976, the Deputy Secretary of Transportation authorized an invitation for bids on the production of the 140-foot tugs. Solicitations were sent to 54 firms, 6 of which actually bid. Bids ranged from a high of $29.7 million to a low of $18.8 million. Upon the favorable recommendation

of a preaward review board, Tacoma Boatbuilding Company was awarded on November 5, 1976, an $18.8 million fixed-price contract with an economic escalation clause to produce four 140-foot tugs. These four tugs are to be assigned to Great Lakes icebreaking duties.

ADDITIONAL PROCUREMENT

Late in fiscal year 1977, the Congress approved and funded the acquisition of two additional 140-foot harbor tugs. The Coast Guard considered three methods of acquiring the additional 140-foot harbor tugs, including noncompetitive negotiation with the current contractor, formal advertising, and construction at the Coast Guard yard.

The Coast Guard favored a negotiated amendment to the current contract because of the builder's known capability and established learning curve, his existing production line, and the benefits of maximum standardization among ships. The Coast Guard also felt that this alternative would be the most economical because of startup and other costs associated with the other two methods of procurement. In March 1978, the Coast Guard began negotiations with the Tacoma Boatbuilding Company for the fifth and sixth 140-foot harbor tugs. On November 17, 1978, negotiations were complete, and the Coast Guard awarded an amendment to the existing contract for about $13.5 million (fiscal year 1976 dollars). The fifth tug, like its four predecessors, will be assigned to the Great Lakes. Although the sixth vessel has not yet been assigned, the Coast Guard is studying its use as an additional Great Lakes support vessel.

SCOPE

We reviewed and analyzed Coast Guard records and data concerning icebreaking, icebreaker use, requirements, and procurement. In addition, we interviewed Coast Guard officials who were involved in the justification, design, engineering, and procurement of the 140-foot harbor tugboats. Our work was performed at the Coast Guard Headquarters, Washington, D.C.; the 9th Coast Guard District, Cleveland, Ohio; the 1st Coast Guard District, Boston, Massachusetts; and the Resident Inspectors Office, Tacoma Boatbuilding Company, Incorporated, Tacoma, Washington.

CHAPTER 2

140-FOOT HARBOR TUGBOATS SHOULD NOT REPLACE EXISTING EAST COAST TUGBOATS

The Coast Guard has designed and is currently planning to buy five 140-foot domestic icebreakers which have icebreaking capabilities excessive for east coast requirements. In addition, because these 140-foot vessels are longer and draw more water than their predecessors, they may not be able to operate in some of the east coast's more critical icebreaking operations areas. This acquisition, in our opinion, could cost the Coast Guard several million dollars for unneeded icebreaking capability and additional operating expenses. It could also result in reduced performance because of operating limitations.

DOES COAST GUARD NEED TO REPLACE ITS TUGBOATS?

The new 140-foot harbor tugboats are being procured because the existing 110-foot harbor tugs are too old, too costly to maintain, not very habitable, and marginally seaworthy. The existing tugs, built between 1939 and 1943, are over 35 years old. Maintenance is a problem, especially in internal machinery, such as engines, steering, and electronic equipment. This machinery frequently breaks down causing unavailability of the ships, sometimes for extended periods. Over the last 8 years, operations and maintenance costs, excluding personnel charges, have steadily increased from about $42,000 per vessel in 1970 to $111,000 in 1977. Due to the age of the 110-foot harbor tugboats, engine and related spare parts are difficult to obtain. Even when obtainable, the leadtime for some engine parts has been 300 days. Other parts are not currently obtainable but must be fabricated on an as needed basis.

With regard to habitability, the existing 110-foot harbor tugboats do not meet modern volunteer-force standards. Sixteen personnel are bunked in a small space. Further, the 110-foot harbor tugboat is not air-conditioned, and noise levels are reportedly intolerable during icebreaking operations.

According to Great Lakes personnel, the existing harbor tugboat was marginal for icebreaking operations in their district. It was a good ship which performed well considering its age, but it was not designed for the severe ice conditions found on the Great Lakes in a normal winter. According

to Coast Guard personnel on the east coast, however, the existing tugs were more than adequate for their icebreaking requirements. Both the east coast and Great Lakes personnel said the existing vessel was not very seaworthy and was unsuitable and unsafe for extended bad weather operations in either the Great Lakes or the Atlantic Ocean, especially while breaking ice.

Although the Coast Guard has justified the replacement of the 110-foot tugs, the question of what should be used to replace these vessels becomes a key issue.

COAST GUARD NEEDS TWO SEPARATE REQUIREMENTS

In our opinion, one weakness in the Coast Guard's approach to replacing the existing 110-foot harbor tugboats is the decision to design a single replacement craft. Because Great Lakes and east coast missions, use, operating constraints, and thus design characteristics are quite different, the Coast Guard should have established two separate operational requirements. Coast Guard participants in a 1973 domestic icebreaking symposium commented on this specific point. They observed that not one, but two types of replacement vessels were needed to replace the aging 110-foot fleet: one vessel for the Great Lakes and possibly Alaska and another for the east coast districts.

GREAT LAKES AND EAST COAST ICEBREAKING REQUIREMENTS

According to Coast Guard files, a vessel which was larger and more powerful than the 110-foot tug was needed for the Great Lakes icebreaking mission. On the other hand, Coast Guard files, reaffirmed by discussions with Coast Guard personnel, also indicate that a vessel very similar to the existing 110-foot tugboat with the same icebreaking capability was needed for the east coast mission.

At a Domestic Icebreaker Symposium in 1973, participants noted that two different icebreakers were needed to replace existing 110-foot vessels. Futhermore, a 1975 Coast Guard study shows that ice conditions are more severe on the Great Lakes than the east coast and clearly establishes the need for a significantly greater level of icebreaking capability on the Great Lakes. Ice conditions shown in this study demonstrate that, for the Great Lakes, the greater capability of the replacement vessel is definitely needed. There is even the need for, and use of, two heavy-duty icebreakers on the Great Lakes. One of these heavy-duty icebreakers is suitable

and used for arctic icebreaking. Additionally, as shown on page 8 and in appendix I, the five Great Lakes harbor tugboats have been used much more extensively and consistently for icebreaking operations than the eight east coast harbor tugboats.

Some private-interest groups, such as Great Lakes shippers and certain boatyards, have even contended that the new 140-foot replacement vessels will not be capable enough for the severe icebreaking requirements of the Great Lakes. The Coast Guard maintains, however, that the new 140-foot vessel will perform satisfactorily on the Great Lakes.

Concerning east coast requirements, evidence shows that existing 110-foot harbor tugboats are satisfactory for normal east coast icebreaking operations. For example, according to a February 1974 briefing paper, except for their age, the present 110-foot harbor tugs were quite satisfactory for east coast icebreaking operations.

CURRENT AND PAST USE DO NOT JUSTIFY A GREATER ICEBREAKING CAPABILITY

The performance of the 110-foot harbor tugboats for the years 1975 through 1977 establishes that breaking ice is not their major mission. Specifically, icebreaking operations accounted for only 29 percent of use for all 13 of the 110-foot harbor tugboats in 1975, 25 percent in 1976, and 42 percent in 1977. For the east coast tugboats alone, icebreaking use was only 5 percent in 1975, 5 percent in 1976, and 31 percent in 1977. The 1977 figure was higher because the winter of 1976-77 was one of the severest in recent history.

Within individual east coast districts, domestic icebreaking activities, as shown in the chart below, rarely accounted for more than 30 percent of operations time. In the 3d and 5th Districts, the 110-foot harbor tugboats spent considerably more time in port security and marine pollution activities than they did in domestic icebreaking activities. In the 1st District, the tugboats are used considerably for search and rescue and law enforcement operations.

Selected East Coast District
Harbor Tugboat Operations--1975 Through 1977

District	Activity	Percent of total operating time charged to the activity		
		FY 1975	FY 1976	FY 1977
1st	Domestic icebreaking	29	8	52
	Search and rescue	27	23	17
	Law enforcement	16	21	11
3d	Domestic icebreaking	0	4	11
	Port security	33	34	54
	Marine pollution	19	25	12
5th	Domestic icebreaking	0	6	42
	Port security	68	42	29
	Marine Pollution	1	5	12

In the Great Lakes during these same 3 years, domestic icebreaking accounted for between 44 and 61 percent of operating time for the five 110-foot craft assigned. Actual icebreaking operations for 110-foot craft by district for the years 1970-1978 (see app. I) show that only the Great Lakes (9th District) tugboats, averaging about 78 8-hour days per year, are heavily used for icebreaking operations. The 1st, 3d, and 5th Districts show little use for icebreaking operations, averaging only about 36, 24, and 19 8-hour days per year, respectively. Additionally, the 1st District apparently had exceedingly light ice years in 1972, 1975, and 1976 when the 110-foot harbor tugboats were used little. Similarly, the 3d and 5th Districts had long periods of almost no 110-foot tugboat icebreaking use, 1973 to 1976 in the 3d District and 1972 to 1976 in the 5th District.

EAST COAST GEOGRAPHY CONSTRAINS DESIGN CHARACTERISTICS OF A REPLACEMENT VESSEL

Because the physical constraints of the east coast operating areas differ from those of the Great Lakes operating areas, two separate requirements should be used to determine tugboat needs. The tugs operating in the Great Lakes have very few operating locations in which vessel length or draft is a consideration. This is not true of the east coast where the icebreaking operations must be conducted on narrow, winding, and shallow rivers and on shallow bays and inlets. The

physical characteristics of these rivers, bays, and inlets restrict the maximum length and draft of a replacement for the 110-foot tug to something about the same size or less. The Coast Guard's 1973 symposium recognized this when it observed that the 1st, 3d, and 5th Coast Guard Districts required a replacement with a length and draft of no more than the existing tug. Specifically, this symposium determined:

--In the 1st District, the shallow water and narrow rivers limited the vessels to a length of about 110 feet and a draft of no more than 12 feet.

--In the 3d District, shallow draft was of the essence, and a vessel similar to the existing 110-foot cutter was required.

--In the 5th district, draft was the most limiting consideration, and a vessel with an 8-foot draft was considered ideal.

The Coast Guard's 1975 icebreaking and icebreaker requirements study reconfirmed the data presented in the 1973 symposium with additional detailed information. Other documents support this data, and at least one document notes that "* * * on the Kennebec River (in Maine) it is only with trepidation and under the force of compelling need that vessels of even this length (135 feet) are used."

In recent discussions with Coast Guard personnel, they indicated that the same conditions still exist in the 1st, 3d, and 5th Districts. Despite this, the Coast Guard decided to design a vessel which had a length and draft greater than the 110-foot tugs.

ONE DESIGN TO SATISFY TWO REQUIREMENTS

In establishing its design constraints, the Coast Guard chose to design for the more critical Great Lakes icebreaking requirement. In establishing its design constraints, the Coast Guard decided on a vessel which clearly exceeded the length, draft, and icebreaking capability of the 110-foot tug. The design criteria called for a length "not to exceed 135'," a draft "not to exceed 12'," and the "maximum icebreaking capability feasible."

With this criteria in mind, the Coast Guard's own engineering department designed a vessel which exceeded the design criteria for length and draft by 5 feet and one-half

foot, respectively. In addition, as shown on the chart below, this vessel had a 150-percent increase in shaft horsepower and a 50-percent increase in icebreaking capability over its predecessor.

Comparison of Characteristics and Capabilities of the Old and New Icebreaking Harbor Tugboats

Characteristic	Harbor Tugboats	
	Old	New
Length	110 ft	140 ft
Beam	27 ft	37-1/2 ft
Draft	11-1/2 ft	12+ ft
Maximum displacement	384 ton	662 ton
Shaft horsepower	1,000 hp	2,500 hp
Maximum speed	11.5 kn	14.7 kn
Crew	1 officer, 19 enlisted	3 officers, 14 enlisted
Continuous icebreaking capability	12-14 in	18-20 in

At this point, a number of Coast Guard personnel commented on the fact that the design had exceeded two of the design criteria. One high official noted that

> "* * * the design group has produced a beautiful cutter. Unfortunately, the design exceeds criteria such as length and draft which have evolved from exhaustive study, analysis, and compromises."

One Coast Guard document states the problem most directly

> "The added capability of the proposed replacement might be nice to have but is it necessary? Consider, especially, the employment of present (and replacement) WYTM's [1/] in the 1st, 3rd, and 5th Districts where non-icebreaking employment greatly exceeds icebreaking employment and where, in any case, the normal severity of ice is well within the capability of present WYTM's. The added capability for over half the class will be excess baggage, in terms of capital investment and operating expense, with respect to foreseen need and anticipated employment."

1/WYTM is the Coast Guard's official designation for this vessel.

Although there is no projection concerning the potential difference in operating expenses, one 1974 Coast Guard study estimates that a 140-foot vessel could cost about $1 million more than a 120-foot vessel to design and build.

Despite the above comments and obvious reservations among a number of Coast Guard personnel, the design was accepted. Although we could not determine precisely why the design was accepted, some documents indicate that the pressing need for the new vessels overrode these reservations about the design.

The first five tugs, which are in the process of being built or are under contract negotiation, will go to the Great Lakes. The destination of the sixth tug, also under contract, is yet to be determined by the Coast Guard. Although the Coast Guard said they have always intended to evaluate the need for the 140-foot vessel on the east coast before requesting funds, data indicates that they were basically committed to building an additional five 140-foot tugs and placing them on the east coast as replacements for existing 110-foot tugs.

CONCLUSIONS

In our opinion, the Coast Guard has sufficient justification to replace the 110-foot vessel. Also, the replacement of the five tugs assigned to the Great Lakes with the new 140-foot tug is appropriate. However, in our opinion, the Coast Guard has not justified its plans to put five such vessels in the east coast districts. Use of existing craft on the east coast does not justify the additional capability of the replacement vessel since east coast operations require a tug more than an icebreaker. The 150-percent increase in shaft horsepower of the 140-foot vessel seems to be excessive for these districts.

Further, to procure these vessels for east coast operations appears to be a waste of both capital investment and operating expense funds. It is difficult to quantify the potential cost of this action in either capital investment or operating expense funds. However, one 1974 design comparison estimated that a 140-foot vessel could cost as much as $1 million more to construct than a 120-foot vessel.

RECOMMENDATION

We recommend that the Coast Guard reevaluate its plans to replace existing east coast harbor tugboats with the 140-foot craft. The Coast Guard should consider

--the overall east coast mission of the 110-foot tugs as well as any other class of vessel currently requiring replacement,

--the potential for consolidating the mission of the 110-foot tug and other aging east coast vessels into a requirement for a single multimission vessel, and

--the life-cycle costs of various alternative designs in selecting a replacement vessel.

AGENCY COMMENTS

The Coast Guard concurred with the recommendation of this report and agreed to reevaluate its plans to replace its existing east coast vessels with the new 140-foot tugboat. Officials stated that the reevaluation efforts inherent in the Coast Guard's planning, programming, and budgeting system process assured that such an analysis would be made. They also stated that our supporting analysis, especially that section dealing with utilization statistics (see pp. 5 and 6 and app. 1) concluding that the 140-foot tug is not the proper replacement for the east coast's 110-foot tug, is shallow and inconclusive.

GAO EVALUATION OF AGENCY COMMENTS

In reviewing official Coast Guard documentation, the only current issue the Coast Guard has in question is how many 140-foot vessels could be used on the east coast to replace the existing 110-foot harbor tugboats. The question of whether they should be put on the east coast, although it was extensively discussed through 1976, seemed to have been resolved affirmatively.

Furthermore, to our knowledge, this issue was not discussed before the Secretary of Transportation when he approved the Coast Guard request for approval to buy the first four 140-foot vessels for the Great Lakes or before the Congress when they approved the funds. In addition, when the Congress funded the add-on buy of two vessels, the Coast Guard obtained a waiver of the Department of Transportation review process on the basis that the procurement of the first four vessels had already been reviewed by the Secretary of Transportation. During our review, we were not convinced that the question of the suitability of this vessel as a replacement vessel for existing east coast harbor tugs would be reevaluated.

In addition to developing the data on prior years' use of tugboats, we looked at the icebreaking activities of other

vessels in the 1st, 3d, and 5th Districts. There are no vessels on the east coast with a greater icebreaking capability than the 110-foot tugs.

In all cases, we found that if the existing 110-foot vessel was not breaking ice, either a less capable vessel was doing it, or none was being done. We interpret this to mean that (1) there was no ice, (2) the ice cover was thin enough so that it could be handled by a vessel with a lesser capability, (3) the need was not significant enough to warrant breaking ice, or (4) the ice was so thick it could not be handled by the 110-foot harbor tugboat. The first three possibilities strongly suggest that a vessel such as the 140-foot replacement with a greater icebreaking capability is not needed. No data that we could find indicated that there were a significant number of east coast ice situations which existing 110-foot vessels could not handle. As a matter of fact, several Coast Guard personnel seemed to believe that the existing 110-foot vessel has adequate icebreaking capability to handle all but the most extreme east coast ice conditions. If the obvious geographic operating restrictions are also considered, the conclusion "* * * that the need for a vessel of the size and icebreaking capability of the new 140-foot craft on the east coast is questionable" is, in our opinion, supported.

CHAPTER 3

COST AND SCHEDULE

No major problems were evident in the Coast Guard's management of the 140-foot harbor tugboat contract or in Tacoma Boatbuilding Company's construction of the vessels. The contractor seemed to be attempting to fulfill his contractual obligations in a timely manner. Construction and delivery of the first harbor tugboat, however, was behind schedule by about 45 days. In our opinion, this delay is insignificant to the program.

COST

As of about November 27, 1978, the actual contract costs for four vessels had increased a total of $2.1 million, or 11 percent over the initially agreed upon contract price of $18.8 million. Under the terms of the basic contract, which was signed on November 5, 1976, the Tacoma Boatbuilding Company was to produce four 140-foot harbor tugs for about $4.6 million each. In addition, it was required to supply an initial block of spare parts at a price of about $500,000. This price is not the maximum contract price, however, since an economic escalation clause in the basic fixed-price contract allows the contractor to recover unanticipated increases in labor and material costs. As of November 27, 1978, this escalation clause has accounted for $1.7 million of the increase in contract price. Specification changes have contributed the other $400,000 increase. The Coast Guard anticipates no further claims or appeals in these first four vessels.

SCHEDULE

The Coast Guard wants the first 140-foot harbor tugboat available for testing and evaluation in the Great Lakes during the 1978-79 ice season. The contract required the Tacoma Boatbuilding Company to deliver the first of the four tugboats to Buffalo, New York, on November 5, 1978. The second, third, and fourth vessels are to be delivered at 90-day intervals thereafter. The key to the testing rests in the first tug. According to contract terms, scheduled deliveries will permit passage through the St. Lawrence Seaway of only the first tug before the seaway closes sometime around December 15. The awarding of the original contract was such that the scheduled delivery date of the first tugboat (November 5) fell so close to the closing date of the St. Lawrence Seaway that there was little leeway (about 40 days) for schedule slippage. The company had originally planned to complete the first vessel

on September 1, 1978, but subsequently pushed the date back to September 29, 1978, after experiencing design problems. This still left a sufficient margin, but in August it asked for a modification to the contract which would delay delivery to Buffalo to December 3, 1978. This request was denied.

During our final conferences with Coast Guard personnel in early December 1978, they said the first tug sailed from Seattle on November 3 and was at Buffalo, New York, on December 8, 1978. Since the seaway will be closed by the February delivery of the second tugboat, the Coast Guard has designated Norfolk, Virginia, as its delivery point. So far, there are no major scheduling problems with either the second, third, or fourth tugs.

The main cause of the schedule slippage on the first 140-foot tug was the initial inability of the Tacoma Boatbuilding Company's design department to produce plans and drawings within the time frame established by the company when it was preparing its bid. At one point the resident inspecting officer reported that the company was 6 to 8 weeks behind in submitting drawings for Coast Guard review. Consequently, a commensurate delay in production resulted.

According to the company, its design department had to expend two to three times more effort on drawings than they had expected because the Coast Guard's specifications were often confusing and contradictory. The company also contended that the Coast Guard's quality control was too tight and it took too long to review and return drawings. Coast Guard, on the other hand, feels that the company caused most of its own problems by leaving items out of the drawings clearly called for by contract specifications, such as welding and joint design information; rushing drawings through its own quality control without adequately checking them for errors; not always flagging corrections made on resubmitted drawings previously rejected by the Coast Guard; and originally underestimating the number of design hours that would be required.

The Coast Guard now feels that the contractor's design department has improved and that many of the problems that led to delivery slippages have been eliminated. The time lost, however, was not regained.

On the whole, actual construction of the tugboats has gone smoothly. The only notable exception was a problem with welding early in the assembly of the first hull. The Coast Guard inspectors found that much of the initial work did not meet specifications. When the company was advised of this problem, it took appropriate corrective action.

Since then, the quality of welding has been generally acceptable.

No other significant problems occurred in the construction of the tugboats. As of the termination of our work at the Tacoma Boatbuilding Company in July 1978, the Coast Guard inspectors were satisfied with the work the company was doing. Several inspectors said they were impressed with the production department's efficiency and the general cooperation they received from the company's management and production personnel.

CONCLUSION

In our opinion, the contractor is attempting to fulfill his contractual obligations in a timely manner. The approximate 45-day delay in delivery of the first vessel is relatively insignificant and will have minimal effect on the Coast Guard's test plans. Construction of these vessels seems to be continuing satisfactorily with very few problems.

AGENCY COMMENTS

Coast Guard personnel agreed with our conclusion. They felt that the current schedule delay was not of great importance and that Tacoma Boatbuilding Corporation was attempting to fulfill its contractual obligations in a timely and forthright manner.

APPENDIX I

HARBOR TUGBOAT OPERATING HOURS CHARGED TO DOMESTIC ICEBREAKING BY DISTRICT--FISCAL YEARS 1970 THROUGH 1978

District	Year	Tugs	Average icebreaking per ship Hours	Average icebreaking per ship Days (note a)	Average icebreaking use per ship 1970 through 1978 Hours	Average icebreaking use per ship 1970 through 1978 Days (note a)
1st	1970	2	379	47		
	1971	2	754	94		
	1972	2	200	25		
	1973	2	369	46		
	1974	2	221	28		
	1975	2	122	15		
	1976	2	25	3		
	1977	2	327	41		
	1978	2	213	27	290	36
3d	1970	3	525	66		
	1971	3	452	57		
	1972	3	279	35		
	1973	3	59	7		
	1974	3	45	6		
	1975	3	3	0		
	1976	3	31	4		
	1977	3	138	17		
	1978	3	182	23	190	24
5th	1970	3	258	32		
	1971	3	213	27		
	1972	3	3	1		
	1973	3	18	2		
	1974	3	0	0		
	1975	3	0	0		
	1976	3	47	6		
	1977	3	b/590	74		
	1978	3	210	26	149	19
9th	1970	5	671	84		
	1971	5	994	124		
	1972	5	967	121		
	1973	5	524	66		
	1974	5	372	47		
	1975	5	478	60		
	1976	5	490	61		
	1977	5	662	83		
	1978	5	489	61	627	78

a/Days are computed on the basis that 8 hours equals 1 day. This can be misleading, however, for if a mission requires it, a ship could be breaking ice for 20 or more continuous hours. The actual number of icebreaking days depends on the specific missions.

b/According to Coast Guard personnel, this was the worst ice year in the 5th District since the late 1950s.

AN EQUAL OPPORTUNITY EMPLOYER

UNITED STATES
GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE,$300

POSTAGE AND FEES PAID
U. S. GENERAL ACCOUNTING OFFICE

THIRD CLASS