REPORT TO THE CONGRESS

Vessel Traffic Systems--What Is Needed To Prevent And Reduce Vessel Accidents?

U.S. Coast Guard

Department of Transportation

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

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

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To the President of the Senate and the
Speaker of the House of Representatives

This is our report entitled "Vessel Traffic Systems--What Is Needed to Prevent and Reduce Vessel Accidents?"

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

We are sending copies of this report to the Director, Office of Management and Budget and the Secretary of Transportation.

Comptroller General
of the United States

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D I G E S T

WHY THE REVIEW WAS MADE

In reviewing the Coast Guard's vessel traffic program to reduce loss of life, injuries, and damage to property and the environment resulting from steadily increasing numbers of serious vessel casualties occurring in U.S. waters, GAO wanted to find out

--what progress had been made in establishing traffic systems and

--if additional actions could be taken to prevent vessel casualties.

The vessel traffic program was authorized under the Ports and Waterways Safety Act of 1972.

FINDINGS AND CONCLUSIONS

During fiscal years 1968 through 1974, there were about 2,800 commercial vessel accidents yearly.

Accidents in 1974 included 1,700 vessel collisions, rammings, and groundings--generally considered to be preventable by vessel traffic systems--that resulted in about $80 million in damages to vessels, cargo, and other property.

In 1972 vessel collisions and groundings caused 157 pollution incidents, spilling 2.2 million gallons of pollutants into U.S. waters.

The number of persons killed or injured each year ranged from a low of 50 in 1970 to a high of 303 in 1974. (See p. 2.)

Since passage of the Ports and Waterways Safety Act of 1972, the Coast Guard has been developing or operating vessel traffic systems in six U.S. ports: San Francisco, Puget Sound (Seattle), Houston-Galveston, New York, New Orleans, and Valdez (Alaska).

These systems use various levels or combinations of electronic surveillance and are becoming increasingly sophisticated and costly.

Two systems--San Francisco and Puget Sound--are currently in operation. The other four systems are scheduled to become operational by 1977. About $30 million is planned to be spent in developing these six systems. The Coast Guard has identified at least 16 other ports and waterways that need vessel traffic systems. (See p. 4.)

Need to redirect the development of vessel traffic systems

Before sophisticated elements are added to the six systems,

the Coast Guard should develop basic systems for several other ports or waterways which would be more cost effective in preventing vessel casualties.

Coast Guard data shows that major reductions in vessel casualties can be effected with basic systems while the incremental reduction in casualties by adding sophisticated system elements is much less. (See p. 7.)

Developing several basic systems in a few ports using vessel movement reporting procedures before advancing to sophisticated elements seems preferable because of the limited funding available and the fact that basic systems

--are expected to prevent more vessel casualties and the resulting losses to property, lives, and the environment;

--should cost less to develop and install;

--should take less time to become operational; and

--will provide for the accumulation of better data on which to plan for more sophisticated elements. (See p. 5.)

For example, the development of basic systems in Houston-Galveston, New York, and New Orleans is expected to cost about $5 million, and should prevent about 72 casualties annually. However, the addition of electronic surveillance in these ports is estimated to cost $9.5 million to $11.5 million, and may only prevent about 30 more vessel casualties annually. (See p. 7.)

With an estimated investment of $3.5 million to $7 million, the Coast Guard could develop basic systems in other ports and waterways that should prevent about 52 vessel casualties a year. Ports and waterways where a basic vessel traffic system should be more cost effective in preventing vessel casualties include Chesapeake Bay, Delaware River and Bay, and five sections of the Gulf Intracoastal Waterway on the Louisiana and Texas coasts. (See p. 7.)

Coast Guard officials agree with the concept of determining the actual effectiveness of vessel traffic systems and their various components by developing systems on a phased approach and by evaluating results obtained during each phase.

Coast Guard headquarters officials, in discussing their reasons for implementing a few sophisticated traffic systems as opposed to implementing basic systems in these and other ports and waterways, contended that complete traffic systems were needed.

They also stated that, in some cases, local maritime interests had expressed a preference for the more sophisticated systems.

However, the Coast Guard Commandant told GAO that the Coast Guard still believes in selecting "* * * the minimum level of services and systems required in each port or area * * *" and that its current

plans are subject to continuing review and revision. (See p. 11.)

Need for additional regulatory actions to improve vessel safety

The Coast Guard had made limited use of its authority under the Ports and Waterways Safety Act of 1972 to regulate vessel movements in U.S. ports and waterways. Vessel movement regulations can play an important role in improving the safety of marine traffic in U.S. ports and waterways where traffic density warrants a vessel traffic system and in those ports where a complete traffic system is not justified. (See p. 14.)

According to Coast Guard estimates, about 15 percent of the accidents considered preventable by vessel traffic systems can be prevented by regulations, if followed. Regulatory actions which should help improve vessel safety include

--vessel speed limits;

--additional controls over the movement of vessels carrying dangerous, combustible, and polluting cargos, such as escorts or restrictions on movement during poor visibility; and

--limitations on the size of tows. (See p. 14.)

In discussions at Coast Guard headquarters, GAO was informed that conditions in each port or waterway were unique and that regulations over vessel movement had to be developed locally. District and local officials said there had been little direction from headquarters to develop regulations. (See p. 15.)

For example, officials at one district stated that they did not followup on recommendations for additional regulations made in Coast Guard studies because they had not been directed to do so by headquarters. Coast Guard officials say the development of vessel movement regulations is quite controversial because of the maritime industry's reluctance to relinquish any degree of control over vessel operation. (See p. 15.)

With regard to regulating speed, the Coast Guard has generally relied on the maritime rules of the road, which call for vessels to proceed at a "moderate" speed in reduced visibility. The few speed limits that have been set cover only localized areas, such as the Saint Mary's River in Michigan. (See p. 15.)

The number of accidents with excessive speed as a major cause indicates the measures taken so far have not been sufficient. A Coast Guard analysis of 218 collisions in fiscal years 1967 through 1969 showed speed to be a major cause in 81 cases. For this reason, GAO believes specific speed limits should be established. These speed limits could be imposed in individual ports or waterways that are particularly hazardous and could be tailored specifically to certain sizes and types of vessels. (See p. 15.)

RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION

The Secretary of Transportation should require the Coast Guard to

--redirect its traffic program to emphasize the development of basic vessel traffic systems in U.S. ports and waterways;

--defer its present plans for further electronic surveillance in Houston-Galveston, New Orleans, and the East River and Newark Bay in New York until basic systems have been developed and placed in operation in these ports and several other major U.S. ports;

--adhere to a strict phased approach by first operating and evaluating the effectiveness of basic systems before adding more sophisticated elements (see p. 12); and

--give national emphasis and direction to establishing regulations as authorized by the 1972 Act to control vessel traffic, including more extensive use of speed limits; greater regulation over the movement of vessels carrying dangerous, combustible, and polluting cargos; and limiting the size of tows. (See p. 21.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

On October 9, 1974, the Department advised GAO that it was undertaking a high-level review of the vessel traffic program because of the issues raised by GAO. However, on November 26, 1974, the Department said that, because of the number and complexity of the issues involved, their resolution has taken longer than initially anticipated and its review was continuing. (See app. I.)

MATTERS FOR CONSIDERATION BY THE CONGRESS

The Congress has expressed continuing interest in efforts to reduce loss of life and damage to property and the environment resulting from vessel casualties. The information in this report on the Coast Guard's plans and GAO's recommendations for an alternative course of action should be useful in Congressional deliberations on appropriation requests for vessel traffic control systems.

CHAPTER 1

WHAT ARE THE VESSEL TRAFFIC PROBLEMS IN THE UNITED STATES?

The American public has demanded that Congressional action be taken to reduce the loss of lives, injuries to people, and damage to property and the environment resulting from the steadily increasing number of serious vessel casualties in U.S. waters. The Congress enacted the Ports and Waterways Safety Act of 1972 (86 Stat. 424) in response to that demand. The act authorized, among other things, the Coast Guard to:

--Establish, operate, and maintain vessel traffic services and systems in congested waterways.

--Require vessels to carry or install electronic or other devices necessary in the traffic system.

--Control vessel traffic, when conditions are hazardous or congested, by specifying times of vessel movements, establishing routing schemes, establishing vessel size and speed limitations, and restricting vessel operations to those vessels with particular operating capabilities.

MARINE TRAFFIC

No other nation in the world has the proliferation of ports, nor the diversity of industry using waterborne transportation, that exists here. The Coast Guard lists 212 ports and waterways which should have their vessel traffic management needs determined. The number of commercial vessel transits through potential vessel traffic systems increased from about 3 million in 1960 to 3.9 million in 1970; it is expected to rise to 4.5 million transits by 1977 and 5.7 million by 1985.

The potential for major incidents resulting in loss of life, personal injury, loss of economic goods and services, and ecological damage is expected to increase. Statistics and forecasts by the Corps of Engineers and the Maritime Administration show that total commercial cargo transported through U.S. ports and waterways will increase from 1.1 billion tons in 1960 to 3.4 billion tons by 1985. Hazardous and potentially polluting cargo will increase from 659 million tons in 1960 to 2.5 billion tons by 1985.

Increases in ship size and speed have accompanied the increases in the number of vessel transits and the volume of cargo. These increases in size and speed, in many cases, reduced ships' maneuverability and reaction time in dangerous situations. According to a 1972 report by the Senate Committee on Commerce on the proposed Ports and Waterways Safety Act of 1972, a 17,000-ton tanker can "crash stop" within half a mile in about 5 minutes. However, a 200,000-ton tanker takes 2-1/2 miles and 21 minutes. During "crash stops," vessels cannot be adequately steered.

MARINE ACCIDENTS

During fiscal years 1968 through 1974, commercial vessel accidents averaged about 2,800 each year. The number of persons killed or injured each year ranged from a low of 50 in 1970 to a high of 303 in 1974. Accidents in 1974 included 1,700 vessel collisions[1], rammings[2], and groundings--generally considered to be preventable by vessel traffic systems--resulting in about $80 million worth of damage.

A summary of accident data reported to the Coast Guard for fiscal years 1968 through 1974 is presented below.

	1968	1969	1970	1971	1972	1973	1974
Total accidents	2,570	2,684	2,582	2,577	2,424	3,108	3,388
Persons killed or injured	65	186	50	137	287	205	303
Collisions, rammings, and grounding in the U.S. waters (note a)	1,342	1,274	1,307	1,460	1,370	1,695	1,775
Estimated losses from collisions, rammings, and groundings (note b)	$42,122	$38,054	$41,087	$41,557	$56,312	$82,688	$80,135

[a]Includes coastal waters, the Great Lakes, and western rivers.

[b]000 omitted.

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[1]An accident involving two or more vessels.

[2]An accident involving a vessel and another object, such as a bridge or pier. Rammings are sometimes referred to or classified as collisions.

Vessel accidents often have an adverse effect on the environment. The following table shows the number of pollution incidents and the volume of spillage resulting from collisions and groundings in U.S. waters.

	1970	1971	1972
Incidents of pollution	55	116	157
Gallons spilled	1,050,000	2,360,000	2,224,000

Accidents caused by inadequate knowledge of prevailing traffic or weather conditions, uncertainty or error concerning the vessel's course or position, or poor seamanship could, in many cases, be avoided through use of a vessel traffic system. However, it is generally recognized that some collisions and groundings are caused by mechanical failures or other factors, such as sudden wind squalls, beyond the control or influence of a vessel traffic system.

A vessel traffic system may include regulations, traffic lanes, a communications network for voice communications between vessels and a traffic control center, and radar or television surveillance. For purposes of this report, traffic systems that include regulations, traffic separation schemes, or a communications network--including vessel movement reporting procedures--are referred to as basic systems. Systems using some form of electronic surveillance (radar or television) are referred to as sophisticated systems.

CHAPTER 2

CAN GREATER BENEFITS BE ACHIEVED BY DEVELOPING BASIC VESSEL TRAFFIC SYSTEMS?

The Secretary of Transportation has established, as a major Department goal, a long-term objective to reduce the incidence of collisions and groundings in the U.S. waters by 40 percent by 1990. In furtherance of this goal, the Coast Guard set an objective to reduce collisions and groundings in selected U.S. ports and waterways by improving the capabilities for marine communications, surveillance, and traffic control.

The Coast Guard, since passage of the Ports and Waterways Safety Act of 1972, has been planning, developing, or operating vessel traffic systems in six U.S. ports: San Francisco, Puget Sound (Seattle), Houston-Galveston, New York, New Orleans, and Valdez (Alaska). These systems, using various levels or combinations of electronic surveillance, are becoming increasingly sophisticated and costly. Two systems--San Francisco and Puget Sound--are currently in operation. The other four systems are scheduled to become operational by 1977. The Coast Guard has identified at least 16 other ports and waterways that need vessel traffic systems.

Funds to plan, develop, and construct vessel traffic systems have been limited. The following table shows the estimated costs and the amounts appropriated for the six vessel traffic systems.

Location	Total estimated cost	Amount Appropriated					
		Prior years	1972	1973	1974	1975	Total
	millions						
San Francisco	$ 8.0	$2.3	$ -	$1.6	$1.9	$ -	$ 5.8
Puget Sound	2.0	-	1.0	-	1.0	-	2.0
Houston-Galveston	2.0	-	-	2.0	-	-	2.0
New York	10.0	-	-	-	4.2	-	4.2
New Orleans	4.6	-	-	-	1.7	-	1.7
Valdez	3.0	-	-	-	-	2.4	2.4
Total	$29.6	$2.3	$1.0	$3.6	$8.8	$2.4	$18.1

At the above rate of funding, it will take several years to develop sophisticated systems in each of the major U.S. ports and waterways.

We believe that greater benefits, in terms of reduced accidents, could be achieved by developing relatively simple or basic systems at these and other ports before advancing to sophisticated systems. Basic systems in several ports seem preferable to the addition of sophisticated elements in a few ports because the basic systems (1) are expected to prevent more vessel casualties and the resulting losses to property, lives, and the environment, (2) should cost less to develop and install, (3) should take less time to become operational, and (4) will provide for the accumulation of better data on which to plan for more sophisticated elements.

EXPECTED EFFECTIVENESS OF VESSEL TRAFFIC SYSTEMS

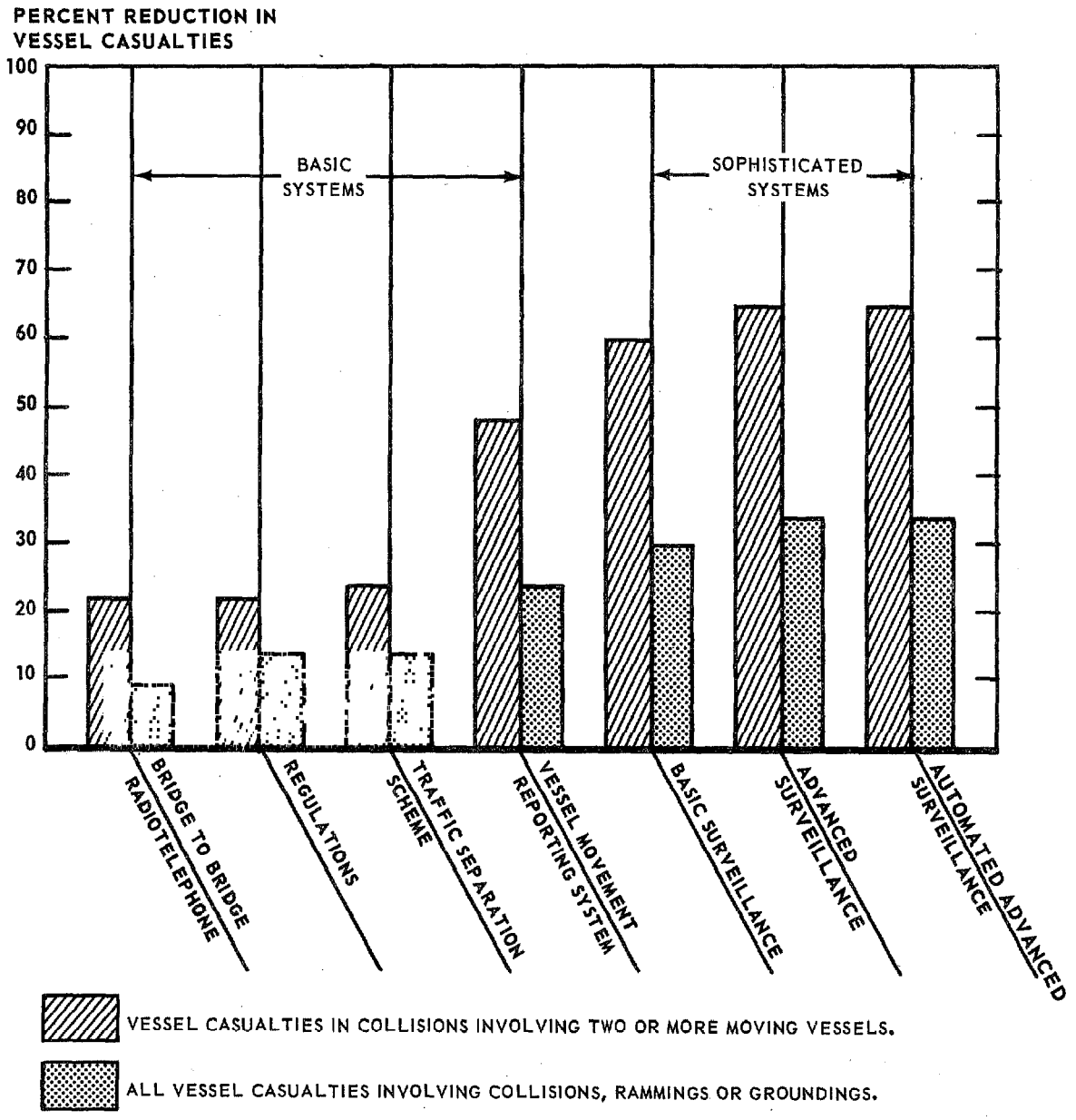
An estimate of the effectiveness of vessel traffic systems in reducing vessel casualties was completed by the Coast Guard in August 1973. The graph on page six shows this estimate, based on an analysis of vessel casualties in 22 U.S. ports and waterways during fiscal year 1969 through 1972.

This estimate shows that major reductions in vessel casualties can be achieved with basic systems, while the incremental reduction in casualties by the addition of sophisticated system elements is much less. The Coast Guard pointed out, however, that the incremental benefits of using sophisticated systems are not really known and that the actual effectiveness would have to be determined by evaluating operating systems.

To design an effective vessel traffic system, the system's effect on marine traffic must be understood in greater detail. The Coast Guard feels this effect is not known well enough to allow immediate design of a fully effective vessel traffic system. It will be necessary to begin with a basic system devoted to information gathering and dissemination and then advance to more sophisticated systems.

Coast Guard officials told us that they agreed with the concept of determining the actual effectiveness of vessel traffic systems and their various components by developing and evaluating systems on a phased approach. In its 1973 Issue Study, the Coast Guard stated that:

ESTIMATED REDUCTION IN ACCIDENTS BY USING VARIOUS VESSEL TRAFFIC SYSTEM COMPONENTS (CUMULATIVE)



"A phased approach will be stressed in the implementation of VTS (vessel traffic systems) in each port or waterway. This procedure will permit experience gained while operating the existing system to be used in planning for a more sophisticated system. It will also provide means to accumulate a better data base."

DEVELOPMENT OF VESSEL TRAFFIC SYSTEMS

The vessel traffic systems being developed in the six ports are using various levels or combinations of electronic surveillance. Analysis of accident records indicates these systems should reduce vessel casualties by about 105 a year. About $30 million is planned to be spent in developing these systems through 1977. About $8 million has already been committed or spent on the systems in San Francisco and Puget Sound. About $3 million is planned for a system in Valdez as required by Section 402 of Public Law 93-153, approved November 16, 1973. Public Law 93-153 authorized construction of the trans-Alaska oil pipeline.

The vessel traffic systems being planned for Houston-Galveston, New York, and New Orleans have not been completed. Before sophisticated elements are added to these systems, the Coast Guard should develop basic systems in these and several other ports or waterways. The development of basic systems in Houston-Galveston, New York, and New Orleans plus television surveillance of the New York-New Jersey Channel of the New York system appears cost effective. These basic systems will cost about $5 million and should prevent about 72 vessel casualties annually. The addition of electronic surveillance in these ports, other than that in the New York-New Jersey Channel, will cost an estimated $9.5 million to $11.5 million and may only prevent about 30 more vessel casualties annually.

With a total estimated investment of from $3.5 million to $7 million, the Coast Guard could develop basic systems in other ports and waterways that should prevent about 52 vessel casualties a year. The ports and waterways where a basic vessel traffic system should be more cost-effective in reducing vessel casualties include Chesapeake Bay (Baltimore, Norfolk, Hampton Roads, and Newport News), Delaware River and Bay (Philadelphia, Trenton, and Camden), and five sections of the Gulf Intracoastal Waterway (Houma, Cote Blanche, Sabine-Neches, Morgan City, and Vermillion River).

Coast Guard officials told us that relatively simple vessel traffic systems would meet the basic needs of most ports and waterways. In a 1971 position paper, "Vessel Traffic Services and Systems," the Coast Guard stated that its policy was:

> "* * * to select the minimum level of services and systems required in each port or area to m nimize the hazards to vessels, fixed objects, and the environment with the least public cost, disruptions of marine traffic, and economic impact."

Available studies and recent Coast Guard experience indicate that a basic system--with regulations, a traffic separation scheme, and a vessel movement reporting system--is expected to:

--Prevent vessel casualties resulting from collisions by about 50 percent.

--Cost about $1 million or less for each port or waterway to develop.

--Take about 1 to 2 years to become operational.

--Provide a relatively complete data base on vessel traffic.

On the other hand, the addition of radar and other electronic surveillance should:

--Prevent vessel casualties caused by collisions by an additional 10 to 15 percent.

--Cost an additional $1 to $9 million to develop in each port or waterway.

--Take 2 to 4 years to become operational.

An example of the trade-offs between a basic system versus the addition of electronic surveillance is apparent in Houston-Galveston. This system is expected to be partially operational in February 1975. It will include a vessel movement reporting system, a complete communication network, television surveillance, and radar surveillance. As presently planned, the total system will be completed in 1977 and is expected to cost about $2 million.

The vessel movement reporting system being developed in this port is expected to:

--Reduce vessel casualties by about 14 annually.

--Reduce property damage by $456,000 annually.

--Cost about $600,000.

--Be operational by February 1975.

--Provide data on traffic volume, types of vessels, types of cargos, and vessel destinations.

The addition of television and radar surveillance is expected to:

--Reduce vessel casualties by two and six, respectively, annually.

--Reduce property damage by $52,000 and $189,000, respectively, annually.

--Cost about $340,000 for the television and $700,000 for the radar.

--Be operational by February 1975 and 1977, respectively.

The expected benefits of preventing 14 vessel casualties annually by installing a movement reporting system in Houston-Galveston seem substantial and cost effective. However, the relative benefits to be derived from sophisticated system elements appear marginal. For example, in November 1972 the Coast Guard's vessel traffic system advisory committee for the Houston-Galveston system informed the Coast Guard that:

> "* * * the cost of low-light level, closed circuit TV for surveillance is too high for the information received. The TV only reveals the presence of a vessel in the area scanned by the camera; this information should have been developed by radio reports; the TV would only serve to confirm the radio reports."

We estimate that it would be more cost effective to use funds planned for the television and radar surveillance in Houston-Galveston to provide simpler systems at one or more of the following locations:

Port of waterway	Preventable annual vessel casualties	Reduced annual property damage
Intracoastal Waterway, near Houma, Louisiana	10	$230,000
Intracoastal Waterway, near Cote Blanche, Louisiana	10	230,000
Intracoastal Waterway, near Sabine-Neches, Texas and Louisiana	9	244,000
Intracoastal Waterway, near Morgan City, Louisiana	9	191,000
Chesapeake Bay, Maryland and Virginia	6	262,000
Intracoastal Waterway, near Vermillion River, Louisiana	5	100,000
Delaware River and Bay New Jersey and Pennsylvania	3	144,000

The communication network needed to support a vessel movement reporting procedure is estimated to cost about $500,000 at each of these ports. For the Intracoastal Waterway, however, 8th Coast Guard District officials said that one communication network could serve several sections of the waterway, thereby making a vessel movement reporting system even more cost-effective. The photograph on page 13 of a barge collision in the Intracoastal Waterway illustrates the type of accident that a vessel movement reporting system should prevent.

The radar or television surveillance being developed in Puget Sound, New Orleans, and the East River and Newark Bay in New York

is estimated to be more costly and less effective in reducing accidents than developing a simple vessel movement reporting system in sections of the Gulf Intracoastal Waterway, Chesapeake Bay, and Delaware River and Bay.

We discussed with Coast Guard headquarters officials their reasons for implementing a few sophisticated traffic systems instead of implementing more basic systems. They contended that complete traffic systems were needed in these ports and stated that, in some cases, local maritime interests had expressed a preference for sophisticated systems.

We requested the Coast Guard's views in a letter discussing the possible advantages of implementing more basic systems, as well as the need for a phased approach. The Coast Guard Commandant, on June 21, 1974, replied that the present plans stemmed from the "Vessel Traffic Systems Issue Study" and "Analysis of Port Needs" and that, at this time, they represented the Coast Guard's best effort in planning for vessel traffic systems. He stated that these documents, completed in 1973, were the result of 1 year's effort and were submitted to the Department of Transportation for forwarding to the Office of Management and Budget. He said that the Coast Guard still believes in the principle "* * * to select the minimum level of services and systems required in each port or area * * *" and that its plans are subject to continuing internal review and periodic revision.

CONCLUSIONS

The funds available to the Coast Guard for developing vessel traffic systems have been limited. Systems have been started in only a few ports, and much of the benefit expected has yet to be realized.

Greater emphasis should be placed on developing basic traffic systems in more ports and waterways than on developing sophisticated systems in a few ports. The development and operation of basic systems would also provide a better data base for adding sophisticated elements to a system. This change in emphasis would, in our opinion, be more cost-effective than the addition of sophisticated elements in a few ports.

RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION

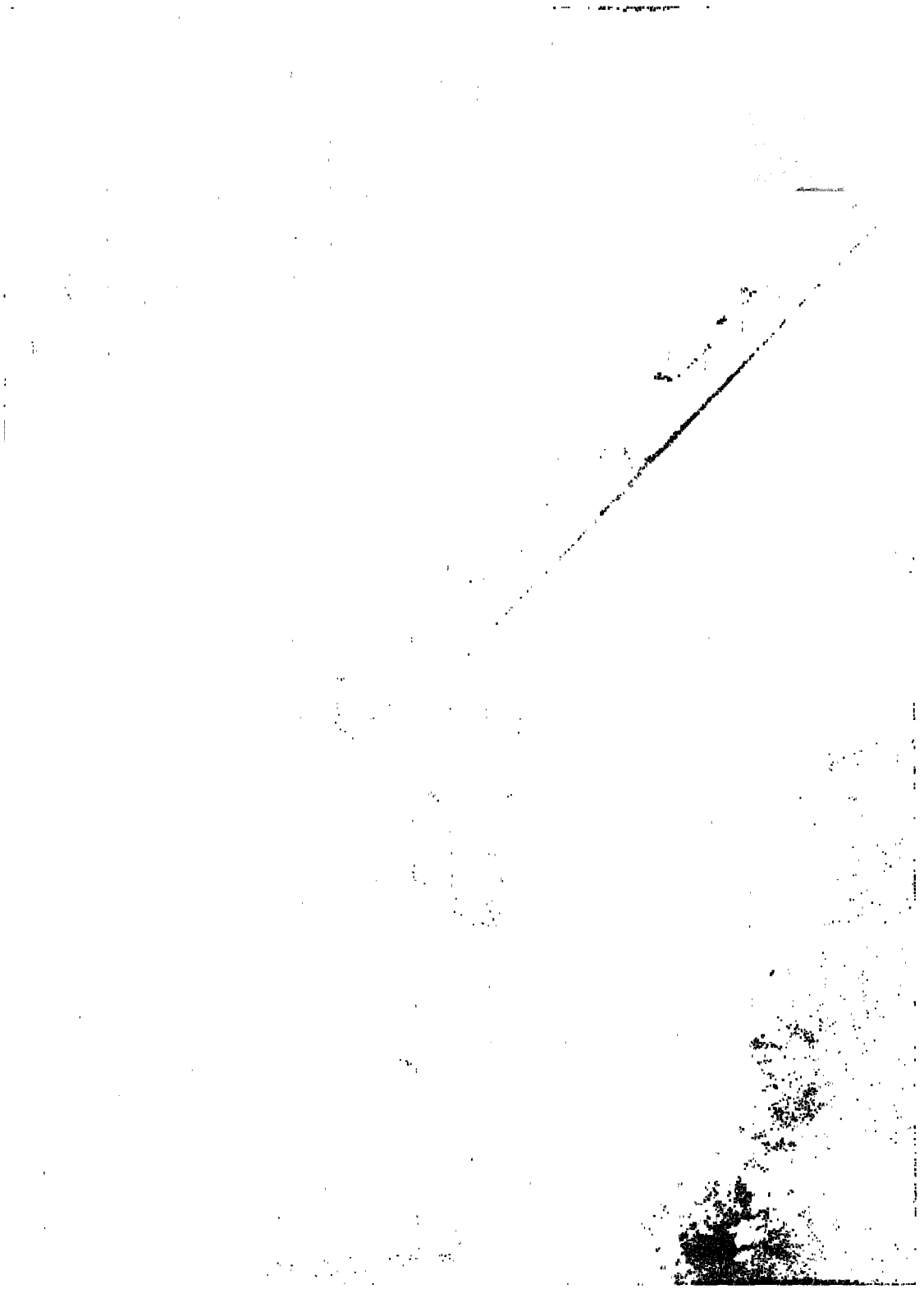
We recommend that the Secretary of Transportation require the Coast Guard to:

--Redirect its traffic program to emphasize the development of basic vessel traffic systems in U.S. ports and waterways.

--Defer its present plans for further electronic surveillance in Houston-Galveston, New Orleans, and the East River and Newark Bay in New York until basic systems have been developed and placed in operation in these and several other major U.S. ports.

--Adhere to a strict phased approach by first operating and evaluating the effectiveness of basic systems before adding more sophisticated elements.

The Department advised us that it was undertaking a high-level review of the vessel traffic program because of the issues raised by our review. (See app. I.)



Barge collision in Gulf Intracoastal Waterway 1972
(U. S. Coast Guard Photo)

CHAPTER 3

WHAT ADDITIONAL REGULATORY ACTIONS COULD IMPROVE VESSEL SAFETY?

The Coast Guard has made limited use of regulations to alleviate vessel traffic problems, although it believes that regulations are the least costly element of a vessel traffic system. Regulating the movement of vessels can be an important factor in improving the safety of U.S. marine traffic. The Coast Guard estimates that, of those accidents considered preventable by vessel traffic systems, properly followed regulations could reduce vessel casualties in major U.S. ports and waterways by about 15 percent. Regulations that limit vessel speed; require escorts for certain vessels or dangerous, combustible, or polluting cargoes; limit vessel movements during restricted visibility; and limit the size of barge tows would improve marine traffic safety. Such regulations are needed to supplement new vessel traffic systems and to improve safety in ports where complete vessel traffic systems are not justified.

The Ports and Waterways Safety Act of 1972 gave the Coast Guard substantial authority to regulate vessel movement and operation. It was authorized to control vessel traffic when conditions are hazardous or congested by specifying times of vessel movements, establishing routing schemes, establishing vessel size and speed limitations, and restricting vessel operations to those vessels with particular operating capabilities. The act and its legislative history were especially concerned with tankers carrying combustible liquids, oil of any kind or form, or hazardous polluting substances.

The Coast Guard has moved slowly in implementing vessel movement regulations. It has not developed a national program for imposing regulatory control of vessel movement. In some cases, the Coast Guard, at the local level, has taken regulatory action; but in the absence of overall direction even these actions have been inconsistent.

The Coast Guard's major action in implementing the 1972 act has been to issue operating rules and regulations for the Puget Sound and San Francisco traffic systems. These regulations are not mandatory and are generally limited to traffic separation and reporting procedures. They do not include speed limits or any special controls over vessels carrying dangerous, combustible, or polluting cargo.

Officials at Coast Guard headquarters told us that conditions in each port or waterway were unique and that regulations over vessel movement have to be developed locally. District and local officials said there had been little direction from headquarters to develop regulations. For example, officials at the 8th District informed us that they did not followup on recommendations for additional regulations made in Coast Guard studies because headquarters had not directed them to do so. Coast Guard officials say the development of vessel movement regulations is quite controversial because of the maritime industry's reluctance to relinquish any degree of control over vessel operation.

NEED FOR VESSEL SPEED LIMITS

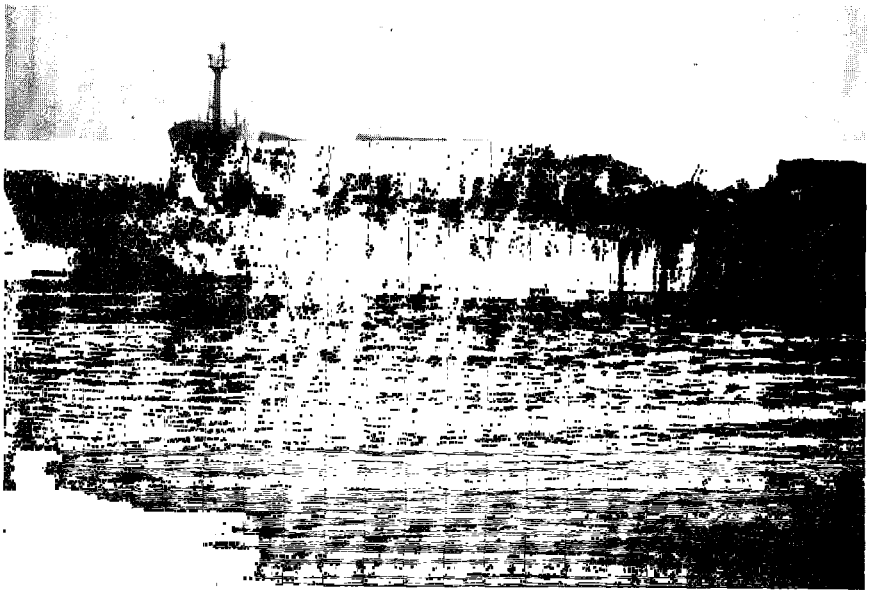
Despite specific legislative authority and strong evidence that excessive speed is a major cause of collisions, the Coast Guard has not taken national action to develop vessel speed limits. The few speed limits that have been set cover only localized areas, such as the Saint Mary's River in Michigan, rather than major ports and waterways.

In general, the Coast Guard has relied upon the maritime rules of the road, which merely call for vessels to proceed at a "moderate" speed in reduced visibility. The number of accidents with excessive speed as a major cause indicate these measures have not been sufficient. We believe specific speed limits should be established. These speed limits could be imposed in individual ports or waterways that are particularly hazardous and could be tailored specifically to certain types and sizes of vessels.

A Coast Guard analysis covering two 3-year periods showed excessive speed as one of the major causes of vessel accidents. Analysis of 199 collisions during fiscal years 1957 through 1959 showed speed to be a major cause in 77 cases. Analysis of 218 collisions in fiscal years 1967 through 1969 showed speed to be a major cause in 81 cases. Individual Coast Guard investigations of more recent vessel accidents often indicated speed as a major cause, primarily in instances of restricted visibility. Examples are a collision in the entrance to San Francisco Bay, which resulted in an 800,000 gallon oil spill; 3 recent (1972 and 1973) vessel collisions in the entrance to Puget Sound; and 16 accidents and pollution incidents in New York harbor from March 1972 through November 1973.

Most major U.S ports do not have speed limits. There are no Coast Guard vessel speed limits in New York harbor, the Hudson River, or Long Island Sound; in the Houston Ship Channel and Galveston Bay; or in Puget Sound. The only speed limit in San Francisco Bay is a 10-knot limit for vessels carrying explosives. Local port authorities in Long Beach and Los Angeles have imposed 6 to 15-knot speed limits, depending on the vessel's size and location.

In November 1973, the Coast Guard's Captain of the Port in New York proposed vessel operating regulations to headquarters, including speed limits of 8, 10, and 12 knots in various sectors of the harbor. He said that a June 1973 collision brought into focus the need for speed limits. A container ship had been proceeding at about 15 knots in a narrow channel adjacent to a crowded anchorage area. It subsequently collided with a tanker and burned. (See photograph below.) He concluded that speed limits in New York were reasonable and necessary to improve safety and should be implemented as an interim measure until incorporated into vessel traffic system regulations. At December 4, 1974, these recommendations were under consideration by the Coast Guard.



Burned container ship after collision with tanker near the entrance to New York Harbor on June 2, 1973. (U.S. Coast Guard photo)

The need for speed limits in the Houston Ship Channel and Galveston Bay has been studied for several years. In November 1969, the Coast Guard's Houston Port Safety and Advisory Council recommended a speed limit of 8 miles per hour. It also recommended that vessels unable to navigate at a safe speed due to trim, draft, or individual shiphandling characteristics, obtain tug assistance. In February 1970, the Houston Captain of the Port advised the District Commander that the "Houston Pilot's 'roadrunners' continue to run unchecked." He endorsed the Port Safety and Advisory Council's recommendation, stating that a speed limit was urgently needed because pilots ran vessels at excess speeds and caused wake damage four to five times monthly.

In May 1973, in response to a congressional inquiry, the Coast Guard again considered the problem of excessive speeds in the Houston Ship Channel. The problem was referred to the Coast Guard's Houston-Galveston traffic system advisory group. In March 1974 the group reported that, before proposed speed regulations could be formulated, a comprehensive study of the physical conditions of the ship channel and of all classes and sizes of vessels using it should be made. It suggested the Corps of Engineers or Texas A&M University as suitable research organizations.

Excessive vessel speeds and the need for speed limits were the subjects most discussed in August 1973 public hearings on regulations for the Puget Sound vessel traffic system. The chairman of the Northwest Maritime Safety Council and executive secretary of the Northwest Towboat Association pointed out that the vessel traffic system regulations would, in effect, create "high speed lanes" and would not improve vessel safety. Without speed restrictions in the Sound, large vessels--capable of speeds up to 33 knots--could travel as fast as they wished. He concluded that the organizations he represented would probably support a mandatory traffic system if, among other things, a speed limit were added for certain parts of the Sound.

Coast Guard headquarters and some District offiicials said speed limits are unneeded and impractical. Some headquarters officials stated that, although excessive speed might be a contributing factor, accidents were really caused because vessel operators did not follow the rules of the road. The District officials said the differing size and configuration of

ships make it extremely difficult to set one speed where all vessels have good maneuverability. The Houston and New York Captains of the Port recommended that tugs be used to assist vessels which were unmaneuverable at lower speeds. The Ports of Long Beach and Los Angeles, which have speed limits, have recognized the problem and their regulations provide for speed variations based on vessel size. While the San Francisco and Puget Sound vessel traffic system commanding officers thought a general speed limit unnecessary, they believed they should have the authority to impose speed limits as the situation demanded.

NEED FOR ADDITIONAL REGULATION OF VESSELS CARRYING DANGEROUS AND COMBUSTIBLE CARGO

The Coast Guard has established only limited regulations over the movement of vessels carrying dangerous, combustible, or polluting cargo. Even these limited controls are not consistent, but vary depending upon the local Coast Guard units and their available resources.

New York is the busiest port in the United States; almost three-fourths of the cargo moving through the port is petroleum products. The Coast Guard, however, exercises little control over vessel movements, except for vessels carrying liquified natural gas. These vessels are required to have a Coast Guard escort; their movement is limited to daylight hours and periods of good visibility; and, while they are in transit, the channel is closed to other vessel traffic. Movement of other vessels in New York is not regulated.

In November 1973, the New York Captain of the Port proposed regulations to Coast Guard Headquarters to prohibit tanker movements in fog because the impact of a tanker collision was great in terms of damage to the environment and danger to human life. He stated that, when visibility was less than one-half mile, a "moderate" speed for a tanker was dead in the water and he deemed it necessary to prohibit its movement. At December 4, 1974, this proposal was under consideration by the Coast Guard.

In the New Orleans area, the second busiest port in the United States, there are no general regulations covering the movement of dangerous, combustible, or polluting cargo. Coast Guard regulation is limited to escorting vessels carrying vinyl chloride and explosives and limiting vinyl chloride movements to daylight hours.

The Captain of the Port stated these restrictions were necessary because of the congestion and hazards of the harbor.

The third busiest port in the United States is Houston, which handles more hazardous cargo than any other port. Despite the traffic density, the narrow ship channel, and the volume of hazardous cargo, there is little Coast Guard control over the movement of vessels. Vessels carrying explosives or other dangerous cargo are not escorted by local Coast Guard units because they lack sufficient resources. The Coast Guard does escort very large vessels transiting the ship channel. Regulations have also been proposed, as part of the Houston-Galveston vessel traffic system operating regulations, to prohibit night movement of liquified natural gas by vessels over 500 feet long.

In Puget Sound, there are no general regulations covering movement of vessels carrying dangerous, combustible, or polluting cargo. There are about 200 transits monthly of vessels carrying dangerous and combustible cargo, primarily petroleum products and chlorine. Coast Guard regulation is limited to escorting vessels carrying explosives, but the volume of this traffic is not significant.

In San Francisco, vessels carrying chlorine are escorted by the Coast Guard. The Coast Guard also escorts, specifies routing, and restricts the movement of ammunition vessels. Other dangerous cargoes are escorted on a case-by-case basis.

Movement of vessels carrying bulk petroleum products were not regulated by the Coast Guard in any of these ports. There is little consistency in the emphasis given by local Coast Guard officials in regulating the movement of vessels carrying dangerous, combustible, and polluting cargo. Given the particularly hazardous nature of some cargoes and their potential to cause a large-scale disaster in case of an accident, the control of vessels carrying dangerous, combustible, or polluting cargoes through U.S. ports and waterways is of particular importance. Coast Guard headquarters should determine the need for and coordinate the implementation of regulations governing the movement of vessels transporting dangerous cargoes. Specific actions could include requiring escorts, specifying conditions when movement is allowed, and specifying routes or closing channels to other traffic.

OTHER REGULATORY ACTIONS WHICH COULD REDUCE ACCIDENTS

There are other regulatory actions or controls over vessel movement and operation which would help to improve vessel safety and better protect the environment. One of these would be the establishment of criteria to insure that towing vessels can control barges.

In a March 1972 report, the National Transportation Safety Board pointed out the need for Coast Guard criteria for minimum towboat capability to control barges. Numerous collisions of towed barges with other vessels and fixed objects, such as locks and bridge piers, have resulted from underpowered towboats. The consequence of insufficient towboat power was illustrated by the collision of two tank barges with an anchored tanker on the Mississippi River south of New Orleans. The towboat could not control the loaded barges in the river current and they drifted and collided with the anchored vessel, causing serious damage by fire to the barges and tanker and serious injury to nine crew members.

A 1973 Coast Guard analysis of accidents on the Intracoastal Waterway, where there is a high volume of barges carrying dangerous or combustible cargo, again showed the effect of underpowered towboats. The analysis indicated that 23 out of 36 rammings of the Berwick Bay Bridges in Louisiana caused by underpowered towboats could have been prevented by regulations limiting the number of barges in a tow or stipulating towboat horsepower requirements. The analysis also showed that 17 out of 39 rammings of the West Port Arthur Bridge in Texas could have been prevented by limiting the size of tows. In 1974, the 8th Coast Guard District set requirements for towboat horsepower and size of tows through the Berwick Bay Bridges as was recommended, but the District has not established any regulations over barge traffic through the West Port Arthur Bridge.

Other regulations that could help improve vessel safety include extending the requirement for direct bridge-to-bridge communication to cover special-use vessels and bridge tenders and requiring vessels to have on board some form of precision navigation equipment. The 1973 Coast Guard study indicated these regulatory actions could have prevented a number of the accidents analyzed. The study also recommended establishing no-passing zones in certain areas.

CONCLUSIONS

The Coast Guard has made limited use of its authority under the Ports and Waterways Safety Act of 1972 to regulate vessel movements. More emphasis should be placed on regulations as a tool for reducing vessel accidents, both in those ports where traffic density warrants a vessel traffic system and in those ports where a complete traffic system is not justified.

Vessel speed limits would reduce vessel accidents. The time has come for the Coast Guard to do more than just continue to study and debate the problem of excessive vessel speeds. Additional controls over the movement of vessels carrying dangerous, combustible, and polluting cargoes, such as escorts and restrictions on movement during poor visibility, should also help reduce vessel accidents and the consequent pollution. Other regulatory actions, such as limitations on the size of tows, could also improve vessel safety.

RECOMMENDATION TO THE SECRETARY OF TRANSPORTATION

We recommend that the Secretary of Transportation require the Coast Guard to give national emphasis and direction to establishing regulations as authorized by the 1972 act to control vessel traffic. These actions should include more extensive use of speed limits; greater regulation over the movement of vessels carrying dangerous, combustible, and polluting cargoes; and limitations on the size of tows.

The Department advised us that it was undertaking a high-level review of the vessel traffic program because of the issues raised by our review. (See app. I.)

CHAPTER 4

SCOPE OF REVIEW

We reviewed the Coast Guard vessel traffic program to determine (1) the progress made in establishing traffic systems and (2) whether additional actions could be taken to prevent vessel casualties.

Our review was conducted at the Washington, D. C., headquarters of the Coast Guard and at five Coast Guard District Offices.

3rd District, New York

8th District, New Orleans

11th District, Long Beach

12th District, San Francisco

13th District, Seattle

We also visited Coast Guard Captain of the Port offices in New York, New Orleans, Houston, Galveston, Los Angeles-Long Beach, San Francisco, and Seattle.

We reviewed the Ports and Waterways Safety Act of 1972, other pertinent legislation, and regulatory action taken by the Coast Guard to implement this legislation. We also reviewed Coast Guard studies and supporting data used to select the types and location of traffic systems being developed. We discussed the need for vessel traffic systems and for other regulatory actions with officials of various port authorities and pilot organizations. We observed the operation of the Coast Guard's Puget Sound and San Francisco traffic systems and the Port of Los Angeles and Long Beach harbor systems.

OFFICE OF THE SECRETARY OF TRANSPORTATION
WASHINGTON, D.C. 20590

ASSISTANT SECRETARY
FOR ADMINISTRATION

November 26, 1974

Mr. Henry Eschwege
Director
Resources and Economic Development
Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Eschwege:

This is in further response to the GAO draft audit report entitled "Vessel Traffic Systems--What is Needed to Prevent Vessel Accidents?". On October 9, 1974, I advised you that this Department was undertaking a high-level review of the U. S. Coast Guard Vessel Traffic System program, and that this review was necessary in order to address the issues raised in the draft report.

This review is continuing. The issues involved in the program are so numerous and so complex, that resolving them in a reasonable fashion has taken longer than had been anticipated. I want to assure you, however, that the review is continuing, and that the necessity to afford this project the very highest priority is well recognized. Of course, if any action is planned to implement features of the Coast Guard's program which were criticized by the GAO, you will be notified in advance of such action, and our basis for such a decision.

Sincerely,

William S. Heffelfinger

APPENDIX II

PRINCIPAL OFFICIALS OF THE DEPARTMENT OF TRANSPORTATION AND THE COAST GUARD RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF TRANSPORTATION		
Secretary of Transportation:		
Claude S Brinegar	Feb. 1973	Present
John A. Volpe	Jan. 1969	Feb. 1973
UNITED STATES COAST GUARD		
Commandant:		
Adm. Owen W Siler	May 1974	Present
Adm. Chester R. Bender	June 1970	May 1974
Chief, Office of Marine Environment and Systems:		
Rear Adm. Robert I. Price	June 1974	Present
Rear Adm. William M. Benkert	Oct. 1974	May 1974

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