Impact of the future merchant fleet on military operating and support programs.

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IMPACT OF THE FUTURE MERCHANT FLEET ON MILITARY OPERATING AND SUPPORT PROGRAMS

by

Ruth Carole Edwards

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Impact of the Future Merchant Fleet on Military Operating and Support Programs

by

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ABSTRACT

This study deals with the impact of ocean shipping trends on the merchant fleet's ability to adequately fulfill its mission of providing a military auxiliary that is substantial enough to meet its role in the defense of the nation. After a brief history of the U.S. merchant fleet, trends in merchant ship technology, size and type are identified. Using these trends, a profile of future merchant ship type and manpower availability is presented. The manpower and ship types which the military would require of the merchant fleet in time of conflict are identified. Program action options to meet manning and shipping requirements are presented. The study concludes that the future U.S. merchant fleet will be unable to totally fulfill its military support requirements for manning or shipping.

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I. INTRODUCTION

A. BACKGROUND

The United States (U.S.) Shipping industury is a prominent element of both the U.S. economy and U.S. defense. During a time of military conflict, the U.S. merchant fleet would be required to provide the greatest proportion of the vessels and manpower for the overseas shipment of cargo. The ability of the merchant fleet to adequately fulfill its mission of providing a military auxiliary that is substantial enough to fulfill its role in the defense of the nation is currently under question. The United States commercial shipping industry has been in a constant state of decline since World War (WW) II [Ref. 1:p. 9]. Mr. R. E. Casey, President, American Merchant Marine Institute, Inc., observes that, "Our active fleet is too small and too old to effectively serve U.S. economic interests, quiet aside from the national defense aspects." [Ref. 2:p. 12] Ship technology, size and type greatly impact on the available manpower and military usefulness of the ships in the merchant fleet. Projections of trends in these areas are therefore of great concern to military planners.

B. STATEMENT OF THE PROBLEM

From a military viewpoint, the decreases in the merchant fleet and the resulting manpower losses are a threat to the

security of the nation. If this trend of decline in commercial shipping continues, manning and shipping alternatives must be sought. Future trends which may help the merchant fleet regain its maritime commercial prominence could have a further negative impact on the fleet's defense usefulness.

C. RESEARCH QUESTION

What impact will ocean shipping trends have on the merchant fleet's ability to meet its military support requirements?

D. METHODOLOGY OF THE STUDY

World wide maritime data was compiled from library research for the purposes of this study. This information was combined with military statistics and requirements. The study identified the most probable trends in commercial ocean shipping through the 1990s, assembles a forecast of the composition of the future merchant fleet, assesses fu- Navy support program manpower and shipping requirements, and evaluates the impact of future trends on the merchant fleet's ability to meet these requirements. Possible alternatives for meeting manning and shipping requirements are presented.

E. CONTENTS

Chapter II provides a brief overview of the history of the merchant marine fleet. Chapter III looks at the commercial ocean shippint trends in ship technology, size, and

type. The military support manning and ship type requirements are stated in Chapter IV along with projections of the merchant fleet's ability to meet these requirements. Chapter V presents alternatives available for providing adequate manning and shipping. Chapter VI presents the conclusions of the study and recommendations.

II. HISTORICAL REVIEW OF THE UNITED STATES MERCHANT MARINE

A. INTRODUCTION

The United States shipping industry has been in continuous decline over the past century with the reasons for that decline woven through a complex web of historical events, world economic conditions and consistently flawed governmental attempts to make U.S. shipping competitive in the world. Due to its importance in the defense of America the merchant marine fleet has often been called the Fourth Arm of Defense of the United States. To quote Admiral James Holloway, U.S. Navy (Ret.) and President of the Council of American-Flag Ship Operators; "Unless the United States goes to war with Mexico or Canada - a rather unlikely turn of events - the United States Merchant Marine is going to play a critical role in any future conflict involving the United States." [Ref. 3:p. 44] In order to understand the current state of the merchant marine force and be able to predict affects of future shipping trends on the force with some degree of accuracy one needs to be aware of the history of the merchant marine fleet and what factors have effected it in the past. This chapter is a summary of that history.

B. GROWTH OF THE U.S. MERCHANT MARINE: 1789-1850

From the earliest times even the mere presence of a formidable fleet was viewed as an aid in the defense of any

country. Whoever could rule the seas could rule the world. The ships of the economy and the defense were perceived to be one and the same. There was vigorous growth for American shipping and the shipbuilding industry during the period between the American Revolution and the Civil war. The first English colonial settlers came to America on ships. From those earliest days in the development of the nation, the sea became an economic mainstay of life in the colonies. The necessity of maintaining a strong merchant marine was recognized from the earliest days of the nation and by the earliest government. Maintaining an adequate supply of U.S. ships could insure that essential trade routes would not be subject to the whims of other foreign vessels which might be unreliable.

Early government intervention resulted in the inclusion of a provision in the Constitution that international and interstate trade would be regulated by the national government. One of the initial steps taken by the first Congress to support this responsibility was the passage of the Tariff Act of 1789. This bill provided import tax incentives for all shippers to ship their goods on American vessels. It also encouraged the ownership of U.S.-built vessels by charging less in U.S. port entry fees to U.S.-built and registered ships. This tended to encourage participation of only U.S.-registered ships in the U.S. coastal trade. In

1817, Congress formally closed U.S. coastal trading to foreign trading [Ref. 4:pp. 51-52].

Thanks to abundant, easily accessible timber along the eastern seaboard the U.S. gradually became pre-eminent in the building of wooden ships. American ships were the best constructed and most durable in the world. With a virtually unlimited supply of wood for vessels, American shipbuilding flourished. During this period the U.S. merchant fleet grew to a position of prominence [Ref. 5:pp. 7-8]. Costs of American built ships were low and by 1790 U.S. ships carried almost ninety percent of the nation's exports and imports. Until the early 1800s the U.S. transported over 80 percent of its goods through its own flag ships [Ref. 4:p. 53].

C. BEGINNING OF THE DECLINE: 1850s - CIVIL WAR

Emerging technologies quickly cast the course of international dominance. The early 1800s saw the introduction of the iron steamship. Instead of moving to the forefront of the new technology, the U.S. chose to improve on the wooden ships and developed the sleek hulled clipper ships of the 1840s. Up until this point in history, American flag ships had been favored by the superior carrying capacity, speed and seaworthiness of American ships. The use of iron, steel and steampower proved to be superior for shipping and this change in technology (the replacement of wood by iron and steel in the shipbuilding craft) resulted in U.S. flag ships losing their competitive edge.

Political events were the next to greatly alter the U.S. shipping industry as the Civil War caused massive destruction of the nation's ships. The North and South decimated each other's vessels in an attempt to interdict shipping. Merchants of American and foreign countries were afraid to ship their goods in American ships because of these attacks. U.S. shipowners, in an attempt to avoid complete financial destruction, sold off many of their assets to foreign shipowners. As much as one third of the merchant fleet was sold during the four years of the Civil War [Ref. 4:p. 57]. By 1866 only 32 percent of American trade was carried in American ships [Ref. 4:p. 58]

After the war the U.S. fleet continued to decline. Wood was easily accessible to the U.S. shipbuilders whereas steel was not. The cost of U.S. steel was much higher than that of European steel. As a result, American steel-built ships (when they were finally built) cost forty to seventy-five percent more than the European vessel. U.S. investors looked to foreign-built vessels and foreign registration [Ref. 4: pp. 56-58].

The decline during the period from 1850 to 1926 was so drastic that there were times when the American merchant fleet completely disappeared from the seas. In 1850, American ships carried between seventy-two and seventy-three percent of the nation's foreign commerce. By 1900, this figure was ten percent and by 1910 it had dropped to 8.7 percent (Ref. 6:p. 20].

This trend continued up until World War (WW) I with the result that the United States had virtually no merchant marine at the outbreak of the war. Needed as a military auxiliary, the Shipping Act of 1916 gave temporary authority for civilian and governmental purchase or lease of foreign ships in order to offset the wartime U.S. shortages. This act spurred a surge in ship construction, resulting in the mass production of over 2,000 units, one-third of which were not completed before the war was over [Ref. 7:p. 5].

D. WORLD WAR I-WORLD WAR II

During WWI there was great incentive to rebuild the merchant fleet and to man it. The Navy relied on the merchant fleet to carry cargo that was required to insure victory. The war brought to light the weaknesses of the merchant marine force and their importance in the defense effort. Several government policies and regulations were passed in an effort to strengthen the force. These policies and regulations still impact on today's merchant fleet. The Seaman's Act of 1915 increased the standards of working and safety for seamen serving on U.S. flag vessels. It strengthened the seafaring unions and laid the initial requirements for use of higher-cost American crews. The Merchant Marine Act of 1916, as previously mentioned, resulted in a large government-owned fleet of which many were unfit as commercial vessels.

The government then had the problem as to what to do with this fleet after the war ended. The Merchant Marine Act of 1920 was passed to deal with this problem. It had two objectives: to provide for the transfer of the fleet of ships to private hands; and secondly, to establish a framework in which the fleet could operate profitably under private management. [Ref. 5:pp. 12-13]

Congress declared in Section 1 of the 1920 Act:

> . . . That it is necessary for the national defense and for the proper growth of its foreign and domestic commerce that the United States shall have a merchant marine of the best equipped and most suitable types of vessels sufficient to carry the greater portion of its commerce and serve as a naval or military auxiliary in time of war or national emergency ultimately to be owned and operated privately by citizens of the United States; and it is hereby declared to be the policy of the United States to do whatever may be necessary to develop and encourage the maintenance of such a merchant marine, and, insofar as may not be inconsistent with the express provisions of the Act, the United States Shipping Board shall, in the disposition of vessels and shipping property as hereinafter provided, in the making of rules and regualtions, and in the administration of the shipping law always in view this purpose and object as the primary end to be obtained. [Ref. 7:p. 5]

Although modified by the Merchant Marine Act of 1936 by substituting the word "substantial" for "greater" in the phrase "the greater portion of its commerce," this policy remains the basis for national maritime policy even today. This legislation represented a new and costly approach to the ills of the maritime industry. Direct subsidies were granted in the forms of construction and operating differentials to increase the number of ships built in American

shipyards, to provide jobs and high wages for merchant seamen caught in the jaws of the Depression and to insure a capable merchant fleet as part of the national defense program.

With the surplus of ships after WWI, carriage of U.S. foreign trade reached a high of fifty-one percent during the early 1920s. That share was not maintained and, except for World War II, has declined steadily. By 1933, the U.S. flag share had fallen to thirty-three percent [Ref. 5:p. 14]. Despite this sufficient number of ships to handle commercial peacetime use, the U.S. transportation industry once again found itself with an insufficient number of ships to handle the role required of it when the U.S. became involved in WW II. Many of the ships that were available were destroyed early on and the country embarked on another around-the-clock building program. Between the years 1940 and 1945, U.S. yards built "5037 merchant vessels of 2,000 gross tons and over." [Ref. 8:p. 53]

WW II is the first time that manpower shortages are recorded for U.S. vessels. The maritime industry had been declining since WW I and the increased need for sailors during WW II quickly outstripped the number of trained sailors available. The manpower shortage continued to exist until the end of the war. Before the war began, there were approximately 60,000 men and officers serving in the U.S. merchant marine [Ref. 9:p. 195]. At the beginning of the war, the merchant marine suffered heavy casualties. Six months

into the conflict, 350 ships with over 3,000 merchant seamen on board were lost. Recruiting and training programs were quickly established but the manning gap was never closed during the war. [Ref. 9:p. 199]

At the close of WW II, the government again found itself faced with a surplus of ships. The Merchant Ship Sales Act of 1946 allowed the government to sell off 2,000 of its 4,500 merchant ships [Ref. 2:p. 17]. These ships were sold to American flag operators and to foreign flags, primarily England, Norway, and France. About 1,400 of the remaining ships were relegated to the National Defense Reserve Fleet (NDRF). The U.S. merchant fleet fell back into a period of decline due to too many ships being available worldwide. With a lack of trade to support them the number of ships began to decline and, correspondingly, the number of jobs available to merchant seamen.

E. AFTER WW II: A PERIOD OF FURTHER DECLINE

After WW II foreign nations committed vast resources to developing new merchant marine fleets. The U.S., by contrast, had little incentive for heavy investment while it was operating large numbers of warbuilt ships. The commitment of foreign nations to their merchant fleet still exists and continues to give them an edge over the U.S. in the areas of technology and advanced design. These two factors allow them to operate more efficiently and with smaller crews and continue to offer better rates to shippers.

Additional problems were caused due to this lack of commitment. Without shipbuilding investments corresponding to trade needs, the U.S. became increasingly dependent on foreign flag ships to transport oil and bulk raw materials for the nation's industries. This shortage of the right type of vessels also left the U.S. unable to compete for foreign trade [Ref. 10:p. 20]. One way that the U.S. shippers did attempt to be competitive was by holding down their capital acquisition costs for as long as possible. Because of the expense involved in purchasing new ships, American companies would maintain old steam-driven inefficient vessels while the rest of the world maritime community was moving to bigger, more energy efficient, diesel vessels. This placed the U.S. industry even further behind. With the decline of the merchant fleet, the fleet's ability to meet its military support program missions continued to decline.

In 1965 the Vietnam conflict renewed the demand for shipping. Ninety-eight percent of the military cargoes deployed to Vietnam were deployed by ship [Ref. 4:p. 92]. Plentiful job opportunities ashore and high wages coupled with the uncertain future of a career at sea contributed to the large number of unfilled seagoing billets. This shortage of skilled marine engineers, deck officers, and skilled seamen in all ratings delayed many of the military cargo sailings.

As a result, in 1969, 135 NDRF sailings experienced a cumulative delay of 649 days or 4.8 days per ship. In 1967 and 1968 there were a total of 201 delayed sailings for an average of 3.4 days per ship [Ref. 11:p. 12]. In addition to delays in sailing times, many ships had to sail short-handed. Based on operating costs of from $2,700 to $3,500 per day, it is estimated that $7,089,400 additional costs were incurred due to these sailing delays [Ref. 12]. Another contributing factor to these shortages was the age of the ships. The technology was old and the seamen who can operate this technology were no longer available as a result of attrition.

The positive effect of the Vietnam Conflict was that it held off the forecasted shrinking of the merchant fleet. A downward trend which had existed since WW II was stalled, for a short time. Although the merchant fleet had been unable to totally fulfill its support mission a more severe decline was temporarily prevented.

F. THE 1980s

The trend in the 1980s continued to be a slow decline in the number of vessels. With the inauguration of President Reagan in January of 1981, there had been a new sense of optimism in the maritime industry. The Reagan Administration appeared to be dedicated to a strong national defense and a correspondingly strong merchant marine. While the

Reagan Administration on one hand favored the construction of a 600-ship navy and undertook measures to begin such a program, it was likewise faced with the problem of a growing deficit and pressure to reduce government spending. The merchant marine industry was to feel the results of these pressures.

Beginning with Fiscal Year (FY) 1982, the Reagan Administration cut construction subsidy funds from the budget. The purposes of these funds had been to help American shipbuilders hold their costs down in order to be competitive with the cheaper foreign shipbuilders. The Reagan Administration requested 15% less for maritime programs in FY 84 than they requested in FY 1983 [Ref. 10:p. 20]. Government assistance in the form of direct subsidies has been discontinued. The number of American flag ships continue to decline while their age continues to increase.

Even though the number of ships continues to decline, the amount of deadweight tonnage has remained fairly constant. The trend has been towards larger ships thus capitalizing on economies of scale. The new larger ships are also more technically advanced and require smaller crews. U.S. flag operator who used to require 35 to 40 people to man their ships now only require 21 or 22 men [Ref. 13:p. 65]. Because of this, seafaring jobs continue to disappear from the U.S. maritime industry and the ability of the fleet to meet its military manning support requirements is in jeopardy.

The current crisis seems to be the result of both short-term imbalances between demand and supply and of the long-term accumulation of aged outmoded ships. Government support in the form of any type of subsidies does not seem probable with the current emphasis on decreasing the budget deficit. This Administration believes in competition as the solution to the merchant marine ills.

The most recent development as of October 1986 is the possibility that the Navy may begin shipping its multimillion-dollar international business aboard foreign vessels. Saying that American commercial ships charge too much. Pentagon officials have proposed easing the restrictions of a 1904 law which gives U.S. shippers first option on carrying all U.S. military goods. The U.S. merchant fleet has countered by saying the fleet's demise would be hurried by losing what they claim to be the largest single source of cargo in the world. The U.S. shippers also warn that the demise of the merchant fleet could weaken the Navy itself which turns to merchant ships in times of war.

Under the newly proposed rule, the Secretary of the Navy--represented by cost-cutting Pentagon contracting officers--would have a wider berth in deciding whether U.S. shippers were priced unfairly. The 1904 law "does not grant the U.S. flag carriers a right to have the government subsidize inefficiency or inappropriate pricing," the Defense Department wrote in the July 28 "Federal Register." The 1904 Act was

specifically passed to keep the merchant fleet afloat during peacetime so that it could meet its wartime requirements when called upon. Currently, the only circumstances where U.S. military cargo can be shifted to foreign flag vessels is when the shippers are charging "excessive or otherwise unreasonable tariffs." [Ref. 14]

G. SUMMARY

Even before it was legislated to do so, the merchant fleet served as a defense auxiliary in time of war. With over 90% of any future military wartime cargo expected to be moved over the ocean, the merchant fleet will maintain a position of importance in the defense of the U.S. The maritime industry has shown the effects of technology, world events, and a fluctuating economy. Its history suggests that only in times of war does the government become truly interested in improving the merchant fleet. The lack of concern has led to the current decrease in ships, decrease in merchant seamen, decrease in the number of jobs available to the mariners and an overall decline of the American merchant fleet. The current state of affairs makes the assessment of future trends even more important in future military planning.

III. OCEAN SHIPPING TRENDS

A. INTRODUCTION

Forecasting commercial shipping trends is difficult but necessary for informed action by the military users of the merchant fleet. Certain trends in ship technology, size and type will have a great impact on the composition of the future U.S. merchant fleet and the fleet's ability to provide future military support. This chapter will examine the major commercial trends to the year 2000 that would affect the military usefulness of the merchant fleet.

B. FUTURE TRENDS IN SHIP TECHNOLOGY

The greatest manpower availability impact will be a result of increasing technological advancements. Jobs which were once done by humans will be automated or computerized. World ocean-borne trade, which has grown at an average rate of 7.4% since 1950, will continue to grow through the year 2000 and this growth in trade will require a parallel growth in total shipping capacity [Ref. 15:pp. 1-3]. Because of technological advances, an increase in shipping capacity does not mean an increase in the number of ships or jobs available for mariners.

1. Automation

Automation of shipboard duties has caused a great decrease in the number of jobs available to the merchant seaman. This trend is projected to continue through the year 2000. The promise of crew costs savings has been a major factor in the introduction of ship board automation. Crew costs represent one of the larger variables among maritime nations. One estimate places U.S. wage costs at six times that of a Chinese crew. Table I shows Great Britain and Singapore with .39:1 and .16:1 crew cost ratios respectively when compared to American crew costs.

TABLE I

TYPICAL CONTAINERSHIP ANNUAL CREW COSTS,
UNITED STATES AND FOREIGN MANNING, 1983

	Crew Nationality		
Costs	United States	United Kingdom	Singapore
Wages (Dollars)	3,780,000	1,433,000	570,000
Subsistence (Dollars)	124,000	82,000	53,000
Ratio to U.S.	1.00	0.39	0.16

SOURCE: Maritime Administration

Wages on U.S. flag vessels account for 20 to 50 percent of total operating costs [Ref. 17:p. 4]. The high U.S. standard of living is the major factor in the higher wage requirements. The maritime industry has become highly unionized and safety requirements combined with union wage requirements have driven crew costs extremely high [Ref. 18: p. 66]. To become competitive with the other world shippers

U.S. flag operators must find ways to cut their costs and attract customers. Automated engine rooms and bridge control have already been introducted into newer ships and shipboard automation is anticipated to be extended to other areas.

A second purpose of ship automation is the improvement of efficiency and reliability of shipboard equipment. Computers are already able to monitor fuel requirements and engine room requirements more accurately than previous human calculations. Introduction of automatic equipment will be accompanied by a rationalization of shipboard work and the use of centralized controls to result in a complete reorganization of the ship crew. Although labor unions may be expected to resist any reduction in crew size, economic pressures have already shown that a larger number of jobs will be lost if the present state of decline continues. Unions will have little to gain if U.S. shipowners go out of business or turn to foreign crews for manning.

Trends to date have primarily focused on reduction of operational functions like engine room watch-keeping and engine bridge control. These have enabled enough crew reduction that ships which formerly required 50 men crews may now be manned by as few as 30 to 35 men. In the future, the trend will be towards instrumentation process control and on line monitoring systems, which will enable large improvements on reliability and reductions in the size of the shipboard maintenance force. [Ref. 19:pp. 1-11]

As the trend towards reduction in crew size continues, one possible result may be the unmanned "slave" ship. In this case, a lead ship with some crew aboard could control a fleet of "slave" ships by radio. These ships would be maintained through periodic visits by helicopter from the lead ship. Some imaginative marine experts are asking if it is necessary for a freighter to waste time going into port at all? They envision nuclear powered cargo ships of enormous size that will remain at sea for years at a time. Cargo, supplies, and crews would be transferred by giant helicopters as ships sail along the cost. [Ref. 20:p. 341]

In his book, The Future of Ships, D. Phillips-Birt raises the question of the human problem as crews become smaller and smaller:

> One might envisage as the approaching ideal, after studying the mass of the electronic navigational equipment on display, ships exceeding 400,000 tons under the control of one man lolling before a bridge console pressing a button from time to time. Then there will be the last button of all which, unpressed and by some super-sensitive means, will issue the warning (to whom is uncertain; perhaps to the owners a few thousand miles away on shore) that the man has died at his post or gone mad; while the ship sails on cool as a Zombie, directed by its icy computer mind, automatically steered, course automatically plotting itself, automatically early-warned of collision, making pre-planned changes of course, fully programmed to meet all emergencies, including the last great adventure of meeting its maker. [Ref. 21:p. 78]

Another possibility Phillips-Birt states is that ships may become totally controlled from the shore. Whether the trend towards crew reduction results only in a certain

percentage of reduction or total reduction, the writer agrees that the trend in crew reduction will continue for reasons of reducing crew costs and making operations more efficient.

2. Propulsion

Propulsion advancements will impact on the size and type of ships to become commercially prominent. At the present, virtually all large commercial ships are propelled by either diesel or steam turbine power plants. These two types of prime movers are anticipated to make accelerated improvements because of their competitive field and the appearance of competitive gas turbine and nuclear plant concepts.

The turn of the century offers great promise for nuclear propulsion. Nuclear propulsion plants on board ships offer several advantages that make them desireable as the size and speed of ships increases. The size, weight and cost of a nuclear reactor does not increase proportionately with their power output, the cost of supplying conventional fuel is saved over the lifetime of the ship, gone is the need for frequent, time consuming fuel replenishments, and the weight from the lesser weight of the nuclear plant saved could be used to carry more cargo [Ref. 22:p. 156]. At present, the high initial capital cost of the nuclear plant is the block to its widespread use. This economic gap is anticipated to narrow and low cost, light weight, nuclear plants will secure an increasing share of the commercial market in the future [Ref. 19:pp. 1-110].

One reason for the slow adaptation to nuclear power is the fact that propulsion systems are intimately linked to the vessels in which they are installed. It is not merely the act of replacing one power plant with another. The ship must be designed and built to the specifications of a nuclear powered vessel. As the existing fleet ages and is replaced, it will then become more economical to the ship owner to make the changeover to nuclear power. [Ref. 19:pp. 3-88]

3. Hull Design

Although some innovative hull types like the new dynamic lift surface vessel which the Navy is experimenting with [Ref. 23] occasionally make headlines, the basic monohull type presently used by the commercial shipping industry is not expected to change and will still dominate the shipping industry at the turn of the century. A continuous stream of refinements in theory and design are expected for the monohull for improvements in such operational features as vibratory and sea keeping behavior. This will allow for much larger vessels to be built. Trends in ship size are covered in more detail in the next section.

4. Cargo Handling

Advancements in cargo handling will encourage shipowners to discontinue the use of the more militarily useful older break-bulk style self sustaining vessel. The break-bulk vessel is characterized by its large hold and its own

on/off loading capability. Although reliable, the cargo handling procedures of this ship type are relatively slow compared to the more modern container ships. Conventional shore-based dry bulk cargo handling facilities will be supplemented by specialized high-rate shipboard conveyor systems which will be equipeed to handle containerized (unitized) cargo.

The trend toward unitization of all non-bulk dry cargo by the year 2003 is anticipated. This will result in a further need for containerships and less need for the break-bulk ship. The unitization of cargo will allow for mechanized handling, which will be automated at all major terminals. Port times of less than half a day will be mandatory in view of air-freight competition and the increased speed of nuclear powered ships [Refs. 18, 19:p. 31, 3-3]. The increased speed and specialization of commercial cargo is positive from the cost and time saving aspect needed by the U.S. shipping industry to become more price competitive. Port costs will be decreased and cargo crew handling costs will be minimized at the expense of reducing one type of ship which has been found to be very useful in the carriage of military cargo.

5. Navigational Aids

By the year 2000 we can expect the complete automation of navigator duties through the use of computers linked to the navigational system. Although this will,

again, offer crew cost savings for the commercial shipowner, it will decrease the number of jobs available to the merchant mariner. The older vessels of the Ready Reserve Force which would be activated in time of crisis would not be equipped with the newest navigational aids available and merchant mariners with navigation skills would be required to man the vessels.

On board the newer commercial vessels automated lookout and proximity warning devices will correct bearing and speed. Computers will link the navigational aids to the propulsion system. The result could be the ability to have shore control of an unmanned ship. Satellites could obviously be designed to provide a radar picture of the oceans of the world and information about the surface and weather conditions over the ocean [Ref. 24:p. 39]. Approaching bad weather systems could be routed around and combined with the least-time route without the aid of any crew onboard [Ref. 21:p. 162].

B. FUTURE TRENDS IN SHIP SIZE

An increase in ship size will offer a unique challenge to the military as bigger and better but fewer ships compose the future fleet. With increasingly powerful means of propulsion and improved monohull design anticipated the only limits on the size of vessels appear to be navigational and economical. [Ref. 19:pp. 1-3] There is a definite trend

to larger sizes of vessels to take advantage of economies of scale with the result being an increase in the total shipping capacity but a slower growth in the total number of ships available [Ref. 25:p. 201].

The increase in cargo handling speed will increase the potential to have larger ships as the required port time and handling costs are kept low. Additionally the increased automation of ships and the fewer number of crew members required due to that automation have added even further to the economies of scale [Ref. 19:p. 62].

The navigation question for ships as they grow larger is an important one for the military. The size of a ship limits the ports that the ship is able to enter and the ability of the ships to come closer to the land. Wartime circumstances may make it necessary for ships to berth in areas that have limited or no port facilities available.

The safety of larger ships is also at question. Although no major increase in the future speed of ships is anticipated, the time and sea room necessary for stopping and simple maneuvers of such large vessels could cause concern. Despite this factor the trend for larger ships is projected to continue until the benefits received level out at some future optimal ship size that has not yet been determined. The military must be aware of and plan for this increase in the size of the vessels that they hope to utilize.

C. FUTURE TRENDS IN SHIP TYPE

What type of ship will the future merchant fleet be able to offer the military? The current U.S. merchant fleet is undergoing a revolution brought about by containerization. A proliferation of specialized ship types in the 1970s caused a number of changes in the world shipping industry. One major impact was specialization and the trend toward containerization of cargo. More and more ships are now designed to carry a specific cargo, such as vehicles, or cargo that is transported in uniform units, such as containers. The introduction of these containers carried by containerships has completely changed the composition of the U.S. merchant fleet and transformed the general cargo business. The fleet is expected to increase its number of containerships while the number of break-bulk ships will continue to decrease. By the year 2005, it is anticipated that almost all commercial shipping will be containerized [Ref. 26:p. 7].

A container, in our specialized sense, is just a big metal box, 20 or 40 feet long by 8 feet high by 8 feet wide. This uniformity of the container has made it possible to ship containerized cargo over land, sea, and air routes from origin to destination with less handling time and less damage or pilferage of goods. By increasing cargo handling speed containerization had made it economically possible to use large ships. An actual decrease in port time required for loading and discharging has resulted despite increased

increased loads. These larger ships are also viewed as the ones that will have the most to gain from the advancement of nuclear propulsion. The time and money savings available have led to a great acceptance of containerization over recent years and increased interest in their future utilization. [Ref. 26:pp. 60-61]

A study on the future of containerized shipping conducted by the Trade Research and Analysis Section of the New York Port Authority showed that, "Clearly a large potential world market for container shipments exists." As more and more ports become equipped to handle the larger container ships and their specialized load the increase in containerization will continue. The Port Authority study categorized cargo into four major groups according to their susceptibility to container handling:

1. Prime

   Prime commodities are generally of high value and high shipping rates with physical characteristics which permit them to be efficiently packed in containers. Many commodities in the prime category are highly susceptable to damage or pilferage. Examples of prime containerized cargoes are liquors and wines, pharmaceuticals, and non-bulky machinery.

2. Suitable

   Suitable commodities are generally of moderate value whose shipping rates are less than those for prime commodities. These commodities have only a modest susceptibility to damage or pilferage. Examples of suitable containerization cargoes are wood shingles, wire products and bagged coffee.

3. Marginal

Marginal commodities are of low value with low shipping rates but can be physically placed in containers. They have little susceptibility to damage or pilferage and may be difficult to containerize because of size, weight, or other packaging problems. Examples of marginal commodities are steel ignots, pig iron, and unmanufactured wood.

4. Unsuitable

Unsuitable cargoes generally cannot be physically placed in a container or are more efficiently carried in a specialized vessel (vehicle vessel). Examples of cargo unsuitable for containerization are scrap iron, large trucks or vehicles, and items of over 40 feet in length or eight feet in width [Ref. 15:p. 6-6].

While some military cargo could be classified in the prime or suitable categories, the major portion of military cargo is oversized and falls into the marginal or unsuitable categories. Containerships are specifically designed to carry containers stacked in cells within the ship. This system alleviates the need to pack, brace, deck, top, and otherwise support the cargo in the holes. Ships are loaded by lifting the containers aboard and placing them in the appropriate cell. Although lacking the flexibility to carry out-sized cargo, these ships make up in volume and handling speed what they may lack in adaptability.

Containerships are classified into two general categories: self-sustaining and non-self-sustaining. A main advantage of the self-sustaining ship is its ability to load and discharge its cargo by means of a gantry crane or other on ship lifting equipment. For this reason it is not dependent upon shore lifting facilities and has the option of

being able to service more ports. The non-self-sustaining ship, however, lacks an on board lifting capability, and it is therefore completely dependent on external or port located cranes for loading or discharge.

The self-sustaining containership was predominate in the early phases of containership construction and would have served a more useful military purpose. As containerization became more popular, major ports were redesignated into elaborate container ports with giant container cranes. Thus, the need for the more expensively constructed self-containership has decreased to the point that all containerships now under construction in the United States are of the non-self-sustaining type [Ref. 28:p. 5].

D. UNPREDICTABLE EVENTS

Unpredictable events such as oil price "shocks," politically motivated actions, and unpredicted technological innovations have the ability to impact dramatically on the future of ocean shipping. The most recent example of an unpredictable event is the sudden decline in oil prices in the mid 1980s.

Only five years ago the proliferation of "super tankers" to more economically transport the expensive commodity of oil was being predicted. Now, with the low pricing of oil making such an investment unprofitable, tankers of all sizes are lying empty in prots or being sold for scrap iron. Containerization is predicted as the transportation mode of the

future but, if a better and more economical method of packaging and shipping is discovered, containerships could be sitting idle in ports or being sold for scrap. The military would need to remain flexible to unpredictable events to some extent.

A technological advance in air travel which could allow for larger loads to be carried more economically could totally erase the need for ocean shipping. Air travel already offers the speed which is affordable for smaller, light weight, high value items. The advantage of ocean shipping is its ability to offer cheap transportation for the heavier, larger, low-value items.

Politically motivated shipping embargos have always hurt the shipping industry. If the United States tries to exert its influence over a greater portion of the world by using trade restriction, the economy of the U.S., the strength of the merchant fleet, and ultimately the defense of the country could be weakened. In light of current events, no projection of the future of shipping would be complete without some mention of terrorism on the sea. There is little doubt that the potential for increase in terrorism exists and that this increase would negatively impact on the commercial shipper. Terrorists have shown that they can have easy access to ships and that they can cause great damage to personnel and cargo. Continued safe shipping depends on the shipowner's ability to "sabatoge" and deflect the saboteur.

Ships at port and certain ports are especially vulnerable. Depending on the political climate, certain ships and ports become very attractive targets for terrorists. The writer believes that, as U.S. policy (i.e., foreign policy and some controversial aspects of domestic policy, such as environmental practices) is perceived to be counter to the goals or interests of certain groups, an increase in terrorism should be anticipated.

Shippers could become hesistant to ship high-value or hard-to-obtain commodities via ship and any progress made to rebuild the U.S. Merchant Fleet could be negated. Cargo would be shipped on "safer" ships of other nations and the U.S. flag fleet which is vital to the economy and defense of this country would only continue to decline.

E. SUMMARY

To be able to fully utilize the merchant fleet of the future the military must be aware of the possible composition of that fleet. The forecast of future trade increase makes it profitable for the U.S. Merchant Fleet to research and develop ways to become more competitive with the other national fleets. Unfortunately, some of the most positive changes from an economically competitive point of view appear to have a negative defense support aspect. Projections profile a merchant fleet consisting of very large, nuclear powered, containerships manned by a minimal number of crew.

IV. IMPACT OF TRENDS ON MILITARY SUPPORT REQUIREMENTS

A. INTRODUCTION

The impact of future trends on the merchant fleet affects the fleet's ability to meet its military support requirements. The U.S. Merchant Fleet serves as the "Fourth Arm of Defense," for the United States. It stands ready to integrate with the Navy in times of conflict to protect U.S. interest overseas, and at the same time provide a continuing supply of raw materials at home. The military has specific manpower and ship support requirements which it relies on the merchant fleet to fulfill. The composition of the merchant fleet cannot change without effecting its ability to provide adequate military support.

The changes in ship technology, size and type are already impacting on the fleet's ability to meet its military support requirements. This chapter will examine and compare the projected merchant fleet and projected military shipping and manning requirements.

B. MANNING REQUIREMENTS

The U.S. Merchant Fleet supports the seafarer manpower pool that must respond to wartime national defense requirements. Figure 1 shows the increasing number of merchant marines (using a 2:1 personnel to billet ratio) that would

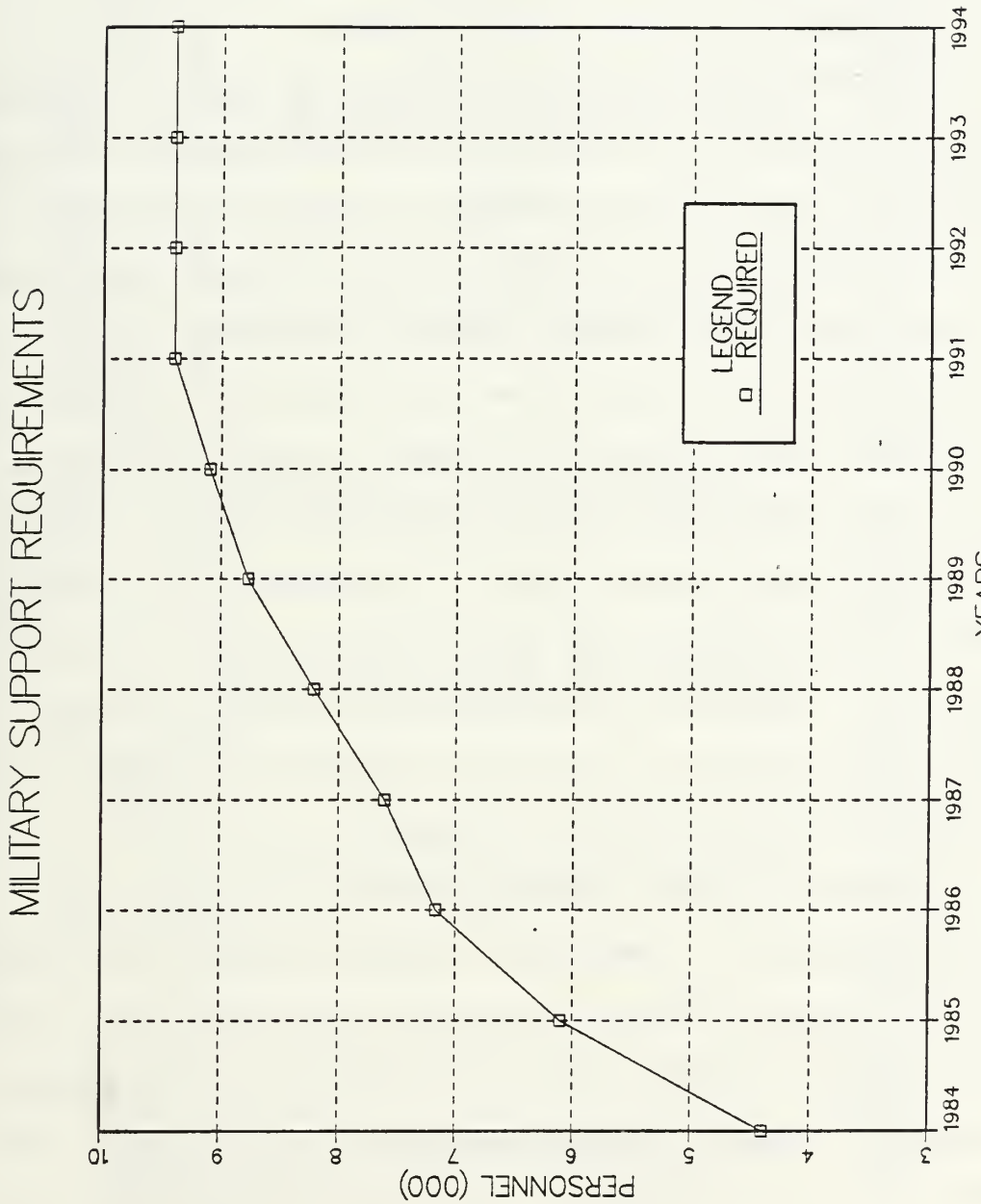

Figure 1 Military Support Requirements

be required to man the Ready Reserve Force if it is activated. The number levels off to 9,396 in 1991 when the number of ships to be added to the Ready Reserve Force reaches its goal of 116 vessels. Tables II and III present the breakdown of those requirements.

The Ready Reserve Force (RRF) is a fleet of government-owned, laid-up ships which would be activated to provide military cargo shipping support in times of emergency. Most of the RRF ships are located at one of three sites--James River, Virginia; Beaumont, Texas; Suisun Bay, California. Present plans are that those ships with ten- and twenty-day readiness requirements will remain in these locations. Those RRF ships with five-day readiness requirements will be relocated near loadout ports. By spreading the ships out, manning requirements are spread over a wider area of responsibility. Hopefully, there would be a better chance that the local unions will be able to provide adequate manpower within the prescribed time windows.

Advances in the technology which allows for fewer crew members onboard a commercial shipping vessel do not apply for RRF vessels because of the way the vessels are obtained. All ships in the RRF are obtained from the U.S. maritime industry. As the industry switches to newer ships the ships that are to be retired but still have a useful life are obtained for the RRF. The average age of the ships is 24.8 years and they must be fully manned to meet all operational requirements.

TABLE II

NUMBER OF UNLICENSED SEAMEN REQUIRED TO FULLY MAN
EACH DEPARTMENT OF READY RESERVE FORCE SHIPS
(1984-1995)

Year	Number of Ships	Number of Unlicensed Seamen					
		Deck		Engineering		Stewards	
		Skilled	Unskilled	Skilled	Unskilled	Skilled	Unskilled
1984	55	394	197	288	193	155	309
1985	73	531	264	385	257	240	480
1986	87	632	315	445	297	277	553
1987	93	667	333	465	310	289	578
1988	101	725	362	505	337	314	628
1989	108	775	387	540	360	336	671
1990	112	804	401	560	374	348	696
1991	116	832	415	580	387	361	712
1992	116	832	415	580	387	361	721
1993	116	832	415	580	387	361	721
1994	116	832	415	580	387	361	721
1995	116	832	415	580	387	361	721

Source: U.S. Department of Transportation, Maritime Administration, Office of Maritime Labor and Training, "Reserve Fleet Crewing Feasibility 1984-1995," p. 21.

TABLE III

NUMBER OF LICENSED SEAMEN REQUIRED TO FULLY MAN EACH DEPARTMENT OF READY RESERVE FORCE SHIPS (1984-1995)

		Number of Licensed Seamen		
Year	Number of Ships	Deck Officer	Engineering Officer	Radio Officer
1984	55	274	336	54
1985	73	364	456	77
1986	87	435	539	92
1987	93	464	571	97
1988	101	504	620	111
1989	108	539	663	113
1990	112	559	688	117
1991	116	578	712	121
1192	116	578	712	121
1993	116	578	712	121
1994	116	578	712	121
1995	116	578	712	121

Source: U.S. Department of Transportation, Maritime Administration, Office of Maritime Labor and Training, "Reserve Fleet Crewing Feasibility 1984-1995,", p. 21.

The manning requirements predicted for military support must take into consideration how the trends in advanced technology will contribute to a reduction in the number of personnel available. The trends in crew reduction are expected to continue based on the economic advantages and operational efficiency that they afford. Although the shipping industry is still far away from the unmanned "slave" ship described in Chapter III the number of billets available to the merchant mariner are decreasing at a steady rate.

A distinction must be made at this point between "billets available" and "manpower requirements." A billet is the actual job position which is available or required to be filled. Manpower requirements are the number of people required to fill the billet. The labor supply ratio allows for two mariners to fill every one billet (this provides for vacation time, training time, and transit time to and from the ships). Therefore, the manpower requirements of a ship with twenty billets is forty people. The deletion of one of these billets results in two mariners being unable to find employment. The unemployed mariner begins to lag behind in ship time and training while waiting for another billet to open. Many mariners have quit viewing the merchant marines as a viable career and have changed professions entirely thus becoming totally unavailable to the maritime manpower pool in time of emergency.

Table IV presents the typical U.S. Merchant Shipboard Organization. By tradition, U.S. flag vessels are organized into three departments: deck, engineering, and steward. The manning level of the ship is usually a function of the class and technology of the ship and the type of service it provides. Technological innovations in the bridge and a remote sensor alarm to monitor engine operating conditions. These innovations remove the requirement for around the clock watch standers in the engine room. As this remote sensor watch is installed in more and more ships, the requirement of having enough unlicensed engine-room personnel to have three per watch can be deleted.

The trend towards instrumentation process control and on line monitoring systems for navigation, will enable large reductions in the size of the shipboard maintenance force. The monitoring systems can identify potential equipment problems that can be repaired while the ship is in port. This reduces the need for large numbers of skilled repair personnel at sea [Ref. 21:pp. 1-11]. The positions of carpenters, electricians, reefer specialists, water tenders and oilers could be affected.

The number of seagoing billets on U.S. flag ships fell from 168,000 after World War II to just 19,000 in 1984 [Ref. 31]. It is anticipated that advancements in technology combined with a decrease in the number of merchant ships will continue to decrease the number of jobs available

TABLE IV

U.S. MERCHANT SHIPBOARD ORGANIZATION

Ship's Master

DECK DEPARTMENT	ENGINEERING DEPARTMENT	STEWARD DEPARTMENT
Licensed Officers		
Chief Mate	Chief Engineer	
Second Mate	1st Asst. Engineer	
Third Mate	2nd Engineer	
Junior Third Mate	3rd Engineer	
Unlicensed Seamen		
Ship's Boatswain	Electricians	Cooks
Able Bodied Seamen	Reefer Specialists	Bakers
Ordinary Seamen	Oilers	Messmen
Carpenters	Firemen	Pantrymen
	Wipers	Utilitymen
	Water Tenders	

The Ship's Purser, Chief Steward, and Radio Officer are all unlicensed Staff Officers also attached to the ship.

Source: Derived from lecture at the Navy School of Physical Distribution Management, 1985.

in the merchant marine force by 4% every year. Previous estimates of the active workforce expected to be available by 1990 were 31,000 people [Ref. 33:p. 9]. Taking into account the increased technology that will allow for reduced manning and result in a further decline of jobs available, Figure 2 shows a projected number of merchant mariners available through the year 1994. In this projection the available 1990 number is 3000.

If the RRF is activated, commercial shipping will continue to function and the commercial ship operators will compete with the RRF ships for available manpower. Assuming that the average 4% annual decline in the number of seagoing billets available continues, by 1990, there will be 13,819 commercial billets that need to be filled. Using the labor supply ratio of 2:1 there will be a need for 27,636 seamen to fill the billets available. If the predicted workforce of 30,000 is actually available there will be adequate manpower for commercial shipping. With the activation of the Ready Reserve Force there will be a minimal requirement of 9,094 men to fill the 4,547 (2:1 ratio) additional billets. The result will be a shortfall of at least 6,730 sailors.

Using data from the 1984 MARAD combined with the data in Tables III and IV, Figure 3 shows the projected number of personnel available, personnel required for commercial billets and additional personnel required to man the Ready

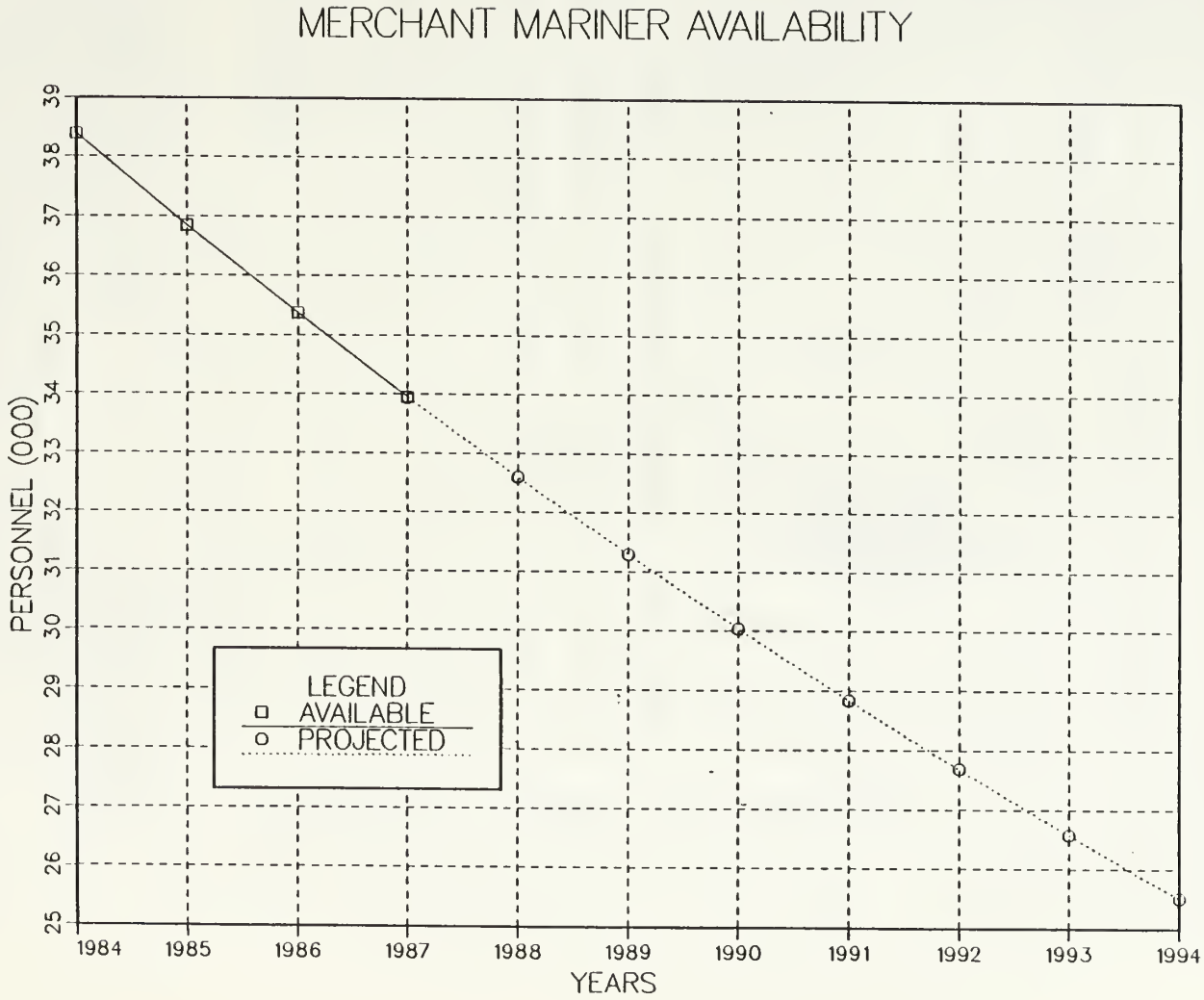

Figure 2 Merchant Mariner Availability

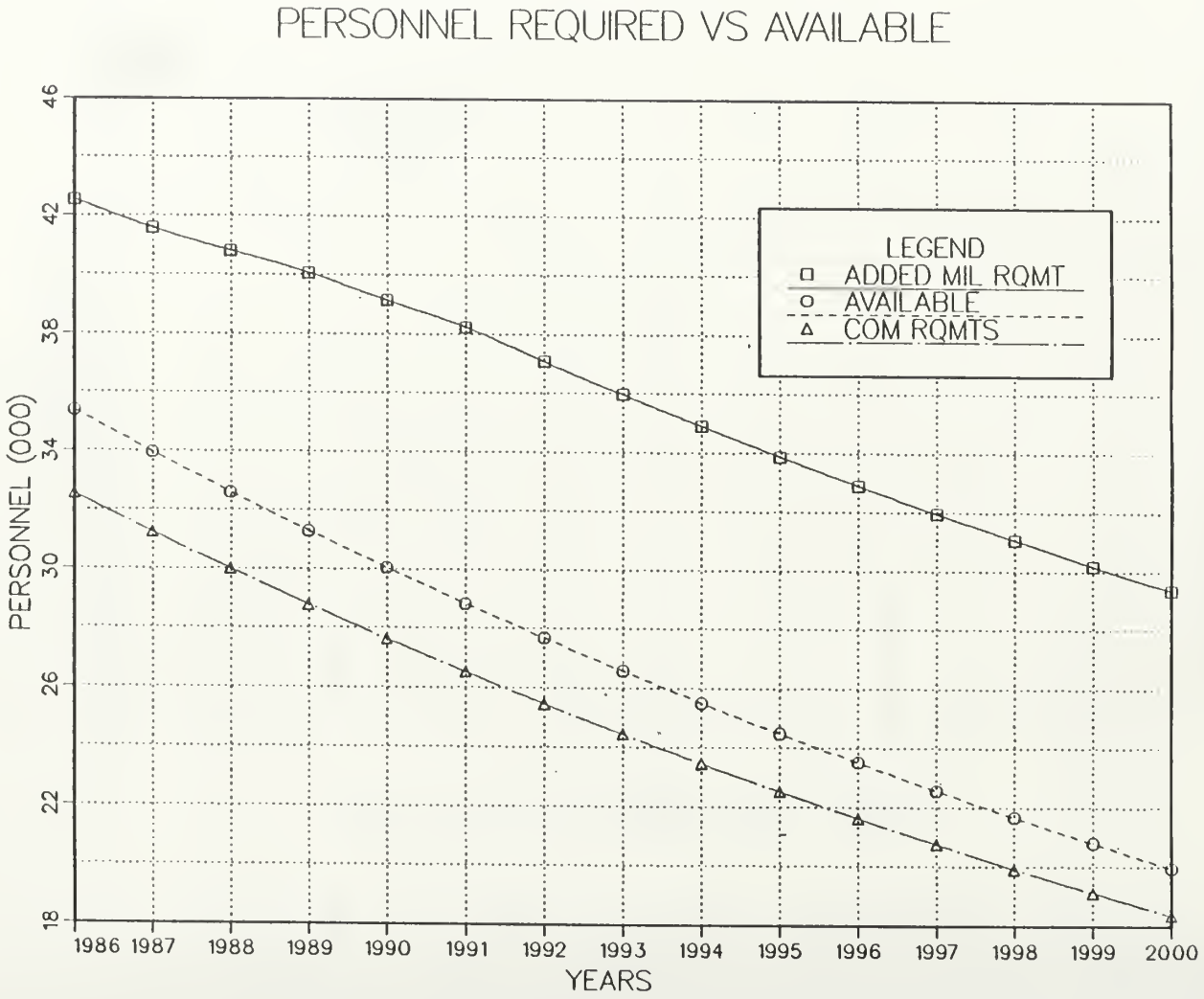

Figure 3 Personnel Required vs Available

Reserve Force beginning in 1986 and projected to the year 2000. In time of peace a sufficient number of mariners will be available to fill commercial billets. In time of a national emergency, the manning gap increases to almost 10,000 by the year 2000.

C. SHIPPING REQUIREMENTS

From the standpoint of national security, one needs to make an important distinction between what is commercially economic and efficient, and what is militarily useful. Economic efficiency is and will continue to be the primary consideration of any private commercial shipping enterprise in the competitive shipping market. The larger specialized commercial ship offers this economic efficiency. With the increasing numbers of larger non-self-sustaining containerships the gap between commercially efficient vessels and those that are militarily useful is growing wider. Table V presents the characteristics of the most militarily useful ships and the corresponding projections of the characteristics.

TABLE V SHIP CHARACTERISTICS

Militarily Useful Ship	Future Ship
a. Relatively small: may use small harbors	a. Increasing in size: requires larger harbors.
b. Flexible: able to carry a variety of cargoes	b. Specialized: containerships or specific cargo
c. Self-sustaining; able to load and off-load cargo without specialized shore facilities.	c. Non-self-sustaining; requires mechanized port facilities to load and off-load.

[Ref. 5:p. 32]

The characteristics that are most useful to the military allow for ships that can adapt to whatever type of cargo the military would ship and be able to utilize the smaller ports which might be more strategically located. Smaller ships would be able to move in closer to the shore, if no port facilities at all are available, and could offer alternative near shore off-loading options. The ability to load and off-load independent of what port facilities are available can be invaluable in providing immediate cargo availability.

Table VI shows the results of a recent assessment of militarily useful vessels owned by U.S. companies.

TABLE VI

MILITARILY USEFUL SHIPS IN THE U.S. OWNED FLEET:
OCEANGOING SHIPS OF 1,000 GROSS TONS AND OVER
AS OF JANUARY 1, 1984

Category	Total Ships	Military Useful Ships
U.S. Flag		
Active Fleet	439	294
Inactive	349	325
Subtotal	788	619
Registered Abroad	602 *	84
Total, U.S. Owned Fleet	1,390	703

*As of January 1, 1983

SOURCE: Maritime Administration and Navy Department

These figures indicate that only about two-thirds of active U.S. flag ships are readily useful for military support. Among U.S. owned registered abroad only 14% are considered militarily useful.

The first major problem facing the military is the difficulty in effectively utilizing the larger containerized vessel of the future in the initial stages of a deployment to underdeveloped areas. The nonavailability of cargo handling equipment or large port facilities in such situations has resulted in a great deal of evaluation and hard work on the part of the Navy. The movement from ship-to-shore of cargo has always been difficult and time consuming. The size of the cargo and vessels initially needed in case of mobilization generally fall into "unsuitable" for containerization category stated in Chapter III. For the cargo that could be containerized the mechanized cargo handling equipment would only be available in the more major ports. The Navy has recently conducted exercises in "Over-the-Shore-Discharge-of-Containership" (OSDOC), and "Container Off-Loading and Transfer System" (COTS). These present exercises should provide tomorrow's methods in ocean transportation.

Another problem of military utilization of containerships is the difficulty of expediously mobilizing and then accumulating the required ships at the locations needed to transport military sealift cargo. Containerships must be in constant service to take advantage of their high ton-mile capacities. They service highly productive routes. Just to assemble the vessels would cause logistical problems. An effective military control of containers would also be necessary.

D. SUMMARY

A threat to the national defense of the United States exists in the merchant fleet's inability to perform its manning and cargo shipment support programs. This threat is projected to increase steadily as the gap between what is required of the fleet and what is available from the fleet increases. The number of mariners available to man the Ready Reserve Force is extremely inadequate. The number of militarily useful ships is also at a dangerously low level. Additional numbers of commercial ships which will be of little military use are expected to dominate the future commercial fleet. Alternatives to provide adequate manning and shipping should be explored by the military.

V. PRESENTATION OF ALTERNATIVES

A. MANPOWER ALTERNATIVES

As seen in the last chapter, manpower shortages are projected to increase. Several alternatives may help resolve the maritime manpower shortages likely to occur during a full activation of the RRF. Those alternatives are discussed below.

1. Merchant Marine Militarized

The option of whether or not to accept employment aboard a ship lies with the merchant mariner. During WW II the decision of mariners not to go back to sea created serious manpower shortages for the British. The British Government reacted with a measure that militarized the merchant marine and forced seamen to go back to sea. This measure helped alleviate much of the British manpower shortage problem for the remainder of the war.

How much of the manpower shortage experienced during the Vietnam Conflict was attributed to seamen choosing not to go to sea has also been a question [Ref. 32:p. 29]. When the RRF is activated, there is the possibility of an artificial manpower shortage because of the reluctance on the part of merchant mariners to support the mission of the RRF ships. One way to avoid this type of shortage and insure that every available mariner is utilized if needed

is to militarize the merchant marine during time of emergency.

The militarization of the merchant marine would force seamen to return to sea. This would remove the right of free choice from one segment of the population simply because of its profession. The risks to merchant mariners in a wartime scenario are often greater than those faced by military vessels because merchant ships and Ready Reserve Force ships are not armed. Forcing people in civilian status into the position of an unarmed soldier would be the main effect of this measure and could carry great social costs.

Militarizing the merchant marine was investigated by Congress during the manpower shortages of WW II. No bill was ever passed because the problem was alleviated by payment of war bonuses and higher wages for merchant mariners. The maritime manpower shortages that occurred during Korea and Vietnam did not raise the question of militarization of the merchant marine to solve the problem. There is no historical precedent for this alternative in the United States and its constitutionality could be questioned.

2. Draft Deferment

The RRF will require unskilled, unlicensed - entry level personnel to man the ships as they are initially activated. Most entry level personnel are between the ages of 18 and 25. If a draft were activated these are the

people who would be drafted first and taken from the maritime labor force. Drafting these people would contribute to a critical manpower shortage for the RRF ships. Allowing these people to remain in the industry in draft deferment status or to enter the merchant marine instead of entering military service would ensure fewer delayed or shorthanded RRF sailings.

The Selective Service System allowed merchant marine draft deferments for those skills that were in short supply during the Vietnam Conflict. While this action did not induce a large number of people to join the maritime workforce, it did provide some relief for the merchant marine [Ref. 32:p. 29]. The historical precedent allows for this to be a reasonably possible alternative to activate to meet future requirements.

3. Contract Manning

The Navy is currently contracting for civilian crews to man some of the classes of ships used for support missions. This preserves jobs in the industry to keep a stable workforce and frees uniformed sailors to man the new 600 ship Navy. The Navy could expand this policy to include ammunition ships (AE), combat stores ships (AFS), and destroyer tenders (AD).

There are disadvantages to this alternative. Civilian manning contracts that have been initiated have not been without their problems. Security clearances are required

for civilians on classified vessels or on classified missions. After receiving costly security checks, merchant seamen are not presented from simply walking off the job before a vessel is to leave. There are no laws that force merchant seamen to go to sea if they choose not to go and the mission may be delayed.

This support training available on these support ships would eventually be lost to uniformed personnel if all support crews were contracted out. The advantages gained for the increased number of billets opened up to the mariners appear to be far outweighed by the possible disadvantages.

B. SHIP REQUIREMENT ALTERNATIVES

The previous chapter also shows the projected gap growing between commercial ships available and militarily useful ships required in event of mobilization. Several alternatives are available to prevent this shortage.

1. Direct Government Procurement of Ships

This option is very attractive because it allows for providing exactly the numbers and types of ships required to support the nation's strategic sealift requirements. The Merchant Marine Act of 1936, as amended in 1981, authorizes this type of procurement. These ships would be built to military specifications but could be used to carry commercial freight during peacetime.

The U.S. maritime industries have been in a continual state of decline since well before the turn of the century except for periods immediately following WW I and WW II. During those wars, massive shipbuilding was responsible for reestablishing the U.S. Merchant Marine. In fact, direct procurement has been the only successful means found in this century for stimulating U.S. merchant shipping [Ref. 5:p. 77]. This would be a very expensive alternative. Under current budget constraints it is doubtful that such a shipbuilding effort would be authorized. The current Administration is facing difficulty in the building of "defense required" without having to fight for the ships that would support these ships. Historical perspective has shown, however, that this alternative is the most likely to be activated if the need arises.

2. Adaptation to Available Commercial Resources

Maximize the use of containers whenever possible, economical, reliable, and responsive to military sealift needs. Continued research and fleet exercises must be accomplished to develop alternative systems of carrying and discharging containerized cargo.

Military ports should continue to be adapted for the larger ships and the necessary cargo loading and unloading systems. The military should conduct research into the development of mobile terminal facilities that would allow for the loading or unloading of cargo under any

circumstances from the commercial ships available in the future. The RRF ships must be kept in sufficient numbers to carry the military cargo which is unsuitable for containerization. This alternative would require the cooperation of both commercial and military shippers.

3. Increased Cooperation

The United States does not have a coordinated civilian and military shipping program. It is unique among maritime nations in the number and fragmentation of organizations representing ship operators and government maritime interests. In many of the major successful maritime nations, a single organization represents ship operating companies and one or two national maritime unions represents labor concerns. Part of the national strategy includes a collaborative maritime research program [Ref. 33:p. 1].

Cooperative efforts should be made towards obtaining ships that will add to the competitive commercial shipping of the U.S. and still offer better options for defense planners. The strengthening of decks, for example, in future commercial ships could allow for their conversion to militarily useful ships which could carry heavier military vehicles. The possibility of offering government building subsidies for ships which meet certain specifications should be discussed.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Future trends in ship technology, size, and type will have a negative impact on the merchant fleet's ability to perform its military support requirements. By the year 2000 it is projected that the manning gap will have widened to an extremely threatening level. Increasing advances in technology will continue to make reduction in the size of commercial crews possible. Future ship size and type will not meet military requirements without adaptation of either the ship or the military cargo to be transported. The merchant fleet of the future will consist of ships which do not meet many of the military ship type requirements. The most militarily useful ships are small, self-contained, and flexible; the opposite of the large, non-self contained, specialized container vessel which is expected to dominate the fleet by the turn of the century.

While military studies have looked at military requirements, these requirements should be looked at in relation to the anticipated changes in the commercial shipping industry. The commercial shipping trends are necessary for the survival of the fleet and are expected to continue past the turn of the century. With these trends continuing, the

gaps in manning and shipping will continue to grow if action is not taken. Several options are available to prevent the manning and shipping shortage.

B. RECOMMENDATIONS

Several alternatives presented in the previous chapter deserve further study. One conclusion appears to be obvious: to bring the merchant fleet back to the forefront of world fleets, able to support the U.S. in both peace and war, a combined maritime and defense effort must be made. This study recommends that several areas especially warrant further study.

1. The U.S. should establish one central coordinating program for commercial and government maritime interest. The goals of maintaining a competitive merchant fleet that can meet certain military specifications need not be mutually exclusive if communication and coordination is emphasized.

2. If conditions require a reinstatement of the draft, draft deferment programs should be established and utilized for personnel in or joining the merchant marine.

3. The direct government procurement of ships to meet the needs not met by the commercial fleet should be established. It is allowed for by law and could serve to stimulate the U.S. shipbuilding industry.

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