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Strategic mobility is divided into three basic elements: airlift, sealift, and the prepositioning of supplies and equipment. The Military Sealift Command (MSC) is responsible for sealift and plays a major role in prepositioning ships and equipment. Through its programs, MSC provides flexibility and increased readiness to strategic mobility. This thesis discusses many interrelated sealift problems: labor and market vagaries, changing ship types and containerization, the changing nature of ports, deregulation and A-76 legislation, the decreasing U.S. merchant fleet, and the struggling shipbuilding industry. MSC's new tactics for strategic sealift, prepositioned ships and fast sealift support, better approach the intent of the national strategy to have surge capability and sustainability in fighting a war.

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Strategic Sealift: Goal and Reality

by

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requirements for the degree of

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ABSTRACT

Strategic mobility is divided into three basic elements: airlift, sealift, and the prepositioning of supplies and equipment. The Military Sealift Command (MSC) is responsible for sealift and plays a major role in prepositioning ships and equipment. Through its programs, MSC provides flexibility and increased readiness to strategic mobility. This thesis discusses many interrelated sealift problems: labor and market vagaries, changing ship types and containerization, the changing nature of ports, deregulation and A-76 legislation, the decreasing U.S. merchant fleet, and the struggling shipbuilding industry. MSC's new tactics for strategic sealift, prepositioned ships and fast sealift support, better approach the intent of the national strategy to have surge capability and sustainability in fighting a war.

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I. INTRODUCTION

A. BACKGROUND

An infant United States quickly learned that transportation control was its key to success. The enemy, simply by blocking foreign trading vessels or by preventing local supplies from being shipped by water to the areas where they were needed, could win every war. Land forms of transportation were almost nonexistent then, but were quickly developed, along with the nation's sea strength. Transportation became a doubly important factor: both commerce and military strength depended heavily on adequate and timely transportation.

By the time of the Mexican-American and Civil Wars, ocean and contract freighting abounded. Railroads were also beginning to play a major role in the shipment of goods. A Merchant Marine force was thriving. The Spanish-American War, our first entirely overseas war, still emphasized the necessity of good planning for both transportation modes and facilities. The railroads could move men and supplies quickly over inland routes, but lack of adequate port facilities caused huge backups and slow service in the supply chain.

By World War I, competition between railroads caused the federal government to seize control of the railroad industry

to ensure proper support of the war effort. In the end this proved not to be a cost efficient operation, although it did provide the most expedient movement of troops and supplies.

Also during this time the trucking industry began to grow rapidly despite strict gasoline rationing. This industry served some of the civilian population's growing transportation needs. The truck's military usefulness was additionally widely recognized and welcomed for its great versatility, especially in the battlefield where most "roadways" were either destroyed or nonexistent. With World War II came confirmation of the importance and usefulness of airlift as a form of transportation, although sealift was then and still is recognized as the most important transportation method during mobilization. The tremendous volume required to support deployed forces can only be supplied by sealift.

Prior to World War I the United States was an isolationist nation. By World War II, however, the United States had become a world leader, and since then has committed its military forces to various different security objectives worldwide. Strategic mobility provides the means to move people, supplies, and equipment to wartime locations; provides continuing support; and allows for the vagaries of war through unpredictable shifts in combat areas and requirements.

The Department of Defense divides its strategic mobility forces into three basic elements: airlift, sealift, and the prepositioning of supplies and equipment. The Military Sealift Command (MSC) is responsible for sealift, and also plays a major role in the prepositioning of ships and equipment.

B. AREA OF RESEARCH

The general area of research is the Military Sealift Command, its mission and goals, and factors affecting strategic sealift. Recent changes in the size and configuration of the U.S. merchant fleet affecting MSC's ability to provide strategic sealift are considered in this thesis. In addition, factors such as deregulation, A-76 legislation, and the changing nature of ports and shipbuilding are reviewed to determine their effect on MSC's ability to meet its goals.

C. SCOPE

This thesis concentrates on specific changes and influences occurring in the last ten to fifteen years. Cargo and special mission components of MSC, although related, are not discussed as they are not specifically part of the concept of strategic sealift.

D. ORGANIZATION

Each chapter of the thesis will address separate factors relating to MSC's mission accomplishment, beginning with a description of MSC and its responsibilities.

E. APPENDICES

Appendices A through N provide information related to MSC operations.

II. THE MILITARY SEALIFT COMMAND (MSC)

A. MISSION

The primary mission of the Military Sealift Command is to provide sealift for strategic mobility in support of national security objectives. This strategic sealift requires MSC to maintain the ability to deploy and sustain military forces and equipment wherever and whenever needed, as quickly and for as long as needed. MSC operates worldwide, providing services for all elements of the Department of Defense (DOD). In addition to strategic sealift, MSC is also responsible for Naval Fleet Auxiliary Force (NFAF) operations, special mission support, and DOD shipping operations. MSC uses government owned ships, books space on scheduled commercial liners, and charters commercial ships. DOD Instruction 5160.10, entitled Single Manager Assignment of Ocean Transportation, establishes command responsibilities and provides policy guidance concerning MSC relationships with the customers it serves and with Navy officials to whom the MSC Commander reports. [Ref. 1]

B. TWO FLEETS

MSC supports its mission by running two fleets: its own fleet consisting of U.S.-government-owned ships and a fleet consisting of ships in the U.S. Merchant Marine. During

peacetime, MSC provides sealift in its own vessels or in ships it charters from private owners. Most shipping is done by merchant ships, except for a small amount that is carried on government vessels. During wartime, however, the fleet of merchant vessels under MSC control grows significantly. Additionally, ships in the ready reserve, or "mothballs," also come under MSC control. This helps maintain the sealift capacity so vital to our national defense. At the end of fiscal year 1984, MSC controlled a total of 132 ships, five of which are ships not in active operation. A breakdown of ships controlled, by type, as given by the MSC 1984 Annual Report [Ref. 1:p. 25] is shown in Table 1.

The 74 total nucleus ships represent 56 percent of the total active MSC controlled fleet, but only a very small portion of military cargo--less than 5 percent in FY84--is carried by government owned ships, and that is expected to drop further as government owned dry cargo ships are placed in reserve status [Ref. 1:p. 14]. This worldwide decline in available dry cargo vessels is increasingly problematic for MSC, as military cargo oftentimes doesn't fit into containers. Further, containerships rely increasingly on pierside cranes for loading and unloading. Placing dry cargo (self-supporting break bulk) ships into reserve status is one way MSC hopes to counteract sealift problems during a contingency need, but it is not a final solution. [Ref. 1]

TABLE 1

MSC CONTROLLED SHIPS
(AS OF 30 SEP 84)

MSC Nucleus		74 (5)
Cargo		
Break Bulk	2 (1)	
RO/RO	2 (1)	
Petroleum (including Bareboat Charters)	12 (1)	
Special Mission Support	18 (1)	
Naval Fleet Auxiliary Force	32 (1)	
Rapid Deployment Force	7	
Chartered (not including spot voyage charter ships)		55
Cargo	17	
Petroleum	14	
Special Mission Support	5	
Naval Fleet Auxiliary Force	1	
Rapid Deployment Force	18	
General Agency Agreement		3
TOTAL MSC CONTROLLED		132 (5)

Note: Figures in parentheses, included in totals, represent nucleus ships not in active operation, i.e., activating, inactivating, phasedown, ready reserve, converting, and modification.

C. NAVAL FLEET AUXILIARY FORCE (NFAF)

Operating the Naval Fleet Auxiliary Force (NFAF) is also one of MSC's primary missions. The NFAF directly supports U.S. Navy ships at sea worldwide. This force is crewed by Civil Service mariners (CIVMARs) supported by small military detachments providing communications, ordnance handling, and assistance during helicopter operations. Underway replenishments, towing, salvage, and cable-laying and repair are a few of the services provided to the fleet. NFAF ships

sail successfully with all U.S. Naval fleets, allowing military operations to continue over longer periods and greater distances than was previously possible.

D. PREPOSITIONING AND FAST SEALIFT SUPPORT

The Near Term Prepositioning Force (NTPF) was begun in 1980 to place sealift capability in areas otherwise difficult to support. NTPF ships are frequently part of convoy exercises and also support other joint U.S.-foreign team exercises. The Maritime Prepositioning Ships (MPS) program dedicates fully loaded mobile maritime prepositioned ships to Marine Corps' usage. Most of these ships are new or converted roll on/roll off (RO/RO) type ships and are operated for MSC under long-term charters to U.S. flag operating firms. These ships are also crewed by a civilian force. The Fast Sealift Support (FSS) program purchased high-speed SL-7 class containerships and converted them to RO/RO usage. These ships are maintained in a status that allows them to be fully activated within 96 hours. In addition, they are activated for approximately 30 days each year for training purposes, and participate in U.S. Naval fleet exercises during that time. The FSS ships are viewed as second-wave support for equipment lift in a crisis, and their speed of over 30 knots represents a tremendous enhancement of sealift capability. [Ref. 1:p. 22]

III. LABOR AND MARKET VAGARIES

A. CIVILIAN LABOR AND UNIONS

One of the greatest problems MSC faces is civilian labor, as the costs have greatly increased with cost-of-living increases and union-gained concessions from management. It is labor cost that has caused U.S. merchant vessel owners to give serious thought to alternative flag registry, for American crews cost so much more than many foreign crews that the cost of running the ship under the U.S. flag is much higher. It is the cost of labor, too, which has been cited as the reason for the demise of the U.S. shipbuilding industry. Shipbuilding is a labor intensive industry, and so a substantial portion of any total cost savings must come from lower wage rates, fewer man-hours to build a ship, or both [Ref. 2:p. 95].

With high labor costs for both ship construction and ship operation, it is no wonder that fewer vessel owners choose U.S. registry. This, in turn, creates a bigger problem: as the number of ships being built in U.S. shipyards declines, the labor skills needed for shipbuilding also decline, ultimately raising the costs of maintaining the necessary skill levels. Similarly, the available pool of mariners is declining because there are few jobs requiring their skills. [Ref. 2:p. 98] Labor unions for

both mariners and shipyard workers, as well as for longshoremen and other associated workers, constantly strive to protect their members' salaries, unfortunately oftentimes to the ruin of their members when high salary costs cause a reduction in employment.

While employers are trying to cut costs and seek new ways to improve their standing in the competitive world market if only to remain an operating (and employing) company, unions resist efforts to cut salaries or hours or benefits, often crippling the employers and sometimes bringing about the closing of the company. Japanese strategies, in contrast, cut corporate dividends first, reduce salaries and bonuses of top management next, and only as a last resort cut pay or reduce hours in the workforce [Ref. 2:p. 97]. This is one reason foreign shipyards have been so successful while U.S. shipyards have been slowly dying.

Labor costs, however, are not an employer's biggest worry: there is always doubt about whether civilian workers will strike. Although contracts are written with clauses covering this contingency, it seems just the thought of a strike is powerful enough to make this issue one bordering on hysteria. Recently MSC was the victim of a strike when one of its contract companies had a disagreement with its labor union:

> An American merchant marine master lost his license in a non-criminal proceeding on 13 November 1985 after the U.S. Coast Guard charged him with the ancient crime of barratry--the use of a ship against an owner's interest.

> Captain Paul Giachetti of Springfield, Pennsylvania, denied the charge and appealed the conviction, stating that he was caught in the middle of a labor dispute in which the Coast Guard had no jurisdiction. Giachetti was master on the Mormacstar, a civilian manned tanker serving as fresh water carrier for the Military Sealift Command's near term prepositioning force off Diego Garcia in October 1984 when his union, the Masters, Mates, and Pilots, and his company, Moore McCormack Bulk Transport, failed to reach an agreement on a new contract. The company, citing court labor law decisions, said that officers are supervisory personnel and that the company therefore was no longer recognizing the union. Giachetti was offered a company contract that was considerably less advantageous to him than the union contract. The union told him to go on strike, and when asked, told him that the Coast Guard historically steers clear of moving against licenses for issues arising during labor disputes. Giachetti told the Military Sealift Command that he would sail in a national emergency and would maintain the safety of the ship. He refused to sail when ordered out on routine maneuvers. A Coast Guard administrative judge hearing the case later ruled that Giachetti endangered national security by sacrificing the readiness of the near-term prepositioning force. He also sacrificed company interests because the ship was placed off charter. [Ref. 3:p. 64]

This example is especially important when one considers that MSC relies heavily on a civilian workforce: of its 6,652 employees reported in 1984, only 743 were military [Ref. 1:p. 34].

B. MARKET PROBLEMS

The high cost of labor also figures in market costs. American shipping companies must compete in a world that includes fleets either partially or fully subsidized by their foreign governments. Private carriers compete fiercely among themselves for market share, but when a government subsidizes its fleet, enabling it to offer prices below cost, other carriers are no longer able to compete

equally. If newly developing countries continue to demand more than their share of the market and communist fleets continue to bid below cost, many Western private carriers may be forced out of business entirely. [Ref. 2:p. 130] High labor costs obviously do nothing to help the situation for American companies. To help our fleet compete in this market, the United States pays an operating-differential subsidy (ODS) to qualified U.S. flag vessels. The ODS is administered by the Maritime Administration (MARAD), which reported a subsidy outlay of $384.3 million during FY 1984 [Ref. 4:p. 9]. The ODS offsets certain lower ship operating costs of foreign flag competitors and uses an index computed annually by the Bureau of Labor Statistics for wage rates. MARAD also considers maintenance and repair, hull and machinery insurance, and protection and indemnity insurance when applying subsidy rates. Not all vessels are eligible for the ODS, however, and even those that do qualify are still hard pressed to show a profit. The subsidy may simply be prolonging eventual industry death. [Ref. 2:p. 102]

Another problem is the changing size of the shipping fleet. Breakbulk cargo ships are being replaced by containerships; tankers are being replaced by huge supertankers. [Ref. 3:p. 316] Although these huge supertankers are more recently being replaced by smaller tankers, the tankers of today are still larger than those operating in the fleet ten years ago. Hence, where once there were many

smaller vessels competing for trade there are now fewer, but much larger, vessels competing in the same market. [Ref. 3:p. 316] The larger vessels may in fact save labor because of smaller crews, but other things equal, they cost more waiting for a "full load."

These larger vessels also created additional problems in terms of overcapacity. There is an overcapacity available which even a decline in world-wide fleet size fails to amend:

> Between mid-1983 and mid-1984, the world merchant fleet of ships over 100 gross register tons (grt) declined, according to Lloyd's Register of Shipping, from 422.6 million to 418.7 million grt. This positive fall of nearly 1 percent brings the total fleet in tonnage terms to a level below that recorded in mid-1980, but although this decline coincided with the first increase in world seaborne trade since 1979 . . ., the fleet is still much larger than is required to undertake the trade available for it. By comparison with 1979, a year in which, even then, there was substantial overcapacity, the ratio of demand to supply has fallen by nearly a quarter. As a result, the surplus of tonnage, which had characterised world shipping since the mid-seventies, continued to prevail. [Ref. 5:p. 52]

Overcapacity is something our sealift strategy almost demands, for overcapacity indicates an ability to provide capability for surge. It is also, however, a problem for the private shipping line whose interest is primarily profit, because it has never been made clear just who should pay for this overcapacity. Larger vessels are a profit-seeking company's solution to its high cost problem, but larger vessels may be a poorer solution in terms of strategic sealift. This is one of the many reasons that the

NDRF includes more general cargo vessels than other types in its total reserve.

IV. CHANGING SHIP TYPES AND CONTAINERIZATION

A. CHANGING SHIP TYPES

Once vessel owners responded to the changing labor market and other market problems by changing the size or configuration of their ships, the very nature of the U.S. fleet changed. Larger ships, equipped with the latest technology, were less costly to run. Moreover, the high cost of fuel made one large transfer more economical than several smaller ones. Just recently, however, lower fuel costs have allowed the smaller, but faster, breakbulk ships to survive a bit longer. In addition, some types of cargo are better suited for breakbulk delivery, and some ports are better able to handle smaller vessels. The technology making supertankers possible has yet to fit that tanker into port: instead, these huge tankers anchor outside a port and have smaller vessels perform loading/unloading. [Ref. 5:p. 50]

The U.S. merchant fleet, like other world fleets, is gradually moving away from breakbulk cargo ships to intermodal vessels such as containerships and from smaller tankers to the giant supertankers. To compete in the world market, the U.S. merchant fleet seeks to use the same technology and advantages as do its rivals. But such technology can make mobilization more difficult. If the

specialized equipment needed to unload these ships isn't available everywhere, then the ships will be of little use in the long run. Huge tankers may not be useful during wartime because their size may make them more vulnerable to attack, potentially slower, or less able to use the best ports.

Strategic sealift suffers from inadequate availability of vessels to dedicate to any mobilization effort and from slow production when once new vessels are contracted for. This combination of inadequate resources and slow production creates a real problem for sealift that technology can only partially alleviate. MSC's purchases of vessels for the Ready Reserve Force (RRF) of the National Defense Reserve Fleet (NDRF) help keep the right mix of vessels available for any contingency. [Ref. 1:p. 40]

B. CONTAINERIZATION

Containerization has had a major impact on strategic sealift because container shipping is rapidly replacing breakbulk shipping. Unfortunately, military cargoes are better suited for breakbulk shipping. The high cost of labor in the U.S. helped containerization gain a strong foothold; its rapid ship loading and unloading made it feasible. Containers are immensely practical when loaded directly from ship to rail car (or vice versa) at a terminal. The intermodal mixing, accessibility, and standardization obtained through containerization are other

important factors for mobilization. Transportation modes have more flexibility and greater usefulness when standardized. Containerization can be a valuable asset to a nation at war, as well as at peace, but it has its drawbacks as well.

As certain ports draw more and more of the market away from smaller, less frequented ports, containerization becomes even more important. With containerization comes the well designed loading facility, complete with dockside cranes to move containers on or off the containerships. Gone, for the most part, is the self-contained ship capable of picking up or delivering its own cargo. Gone, too, is an important feature of strategic sealift. A containership is less useful for strategic sealift if it is too large to get into possible "ports," if it cannot deliver its cargo because the "port" has no cranes to lift containers, or if the "port" doesn't have enough yard space to maneuver the cargo for transport or transfer.

MSC is seeking to avoid some of these potential problems by buying breakbulk ships for the RRF and by buying and prepositioning crane ships in areas where they can do the most good. Meanwhile, MSC is still looking for ways to handle a container once it has gotten to its port of debarkation: will the container be unpacked at the port or moved to its final destination? Also, possible forms of land transportation are being studied. [Ref. 1:p. 30]

In the meantime, DOD cargo moves by containership whenever possible, because containers offer additional security to the cargo. Equipment too bulky to fit standard containers can be shipped in special seasheds or on flatracks that fit into containerships.

As the U.S. merchant fleet continues to grow in this direction, some part of its usefulness to strategic sealift is lost. MSC can purchase breakbulk ships for standby purposes, but the U.S. merchant fleet is the mainstay of our readiness program because it can respond quickly when called, while the ships in the RRF still require a five to ten day preparation period before they are ready to deploy. The biggest problem with the newest containerships is their size, for the newer ships are even larger in order to achieve economies of scale. Conceivably, in the event that some of these huge containerships are required for strategic sealift, they would not be able to get close enough to a port to unload, even were the ship self-contained or a crane ship available.

V. THE CHANGING NATURE OF PORTS

A. DISAPPEARING HINTERLANDS

U.S. hinterlands, the areas surrounding and/or relying on specific seaports for movement of goods essential to their economies, are undergoing rapid alteration due to recent changes in the U.S. economy. Not only is the U.S. industrial base changing, but industries are also relocating and the U.S. pattern of foreign trade has shifted. Pacific Basin trade is growing while European trade declines. In addition, the U.S. is importing more finished goods and exporting fewer. All of these changes affect the ports handling the cargo as well as the methods. Containerization, combined with deregulation, has resulted in a whole new concept of logistics planning, and destroyed the old concept of "natural" hinterlands. [Ref. 6]

Traditionally, whether traffic management in a company was decentralized or centralized, the typical approach to import/export distribution focused on minimizing inland transportation expenses [Ref. 6]. This helped to promote the concept of "natural" hinterlands, since companies routinely shipped their goods to the closest seaport. With deregulation, however, and the parallel growth of containerization, efficiency and greater economies of scale could be achieved by carefully selecting seaports offering

more frequent sailings, speedier handling, direct routing, and/or other features which would allow the company to minimize total transit times, and thus minimize its total costs. This logistics concept, freely employed, is causing "natural" hinterlands to cease to exist in most parts of the country. [Ref. 6]

B. INTERMODALITY

Intermodality, the prime feature of containerization, has done much to help create the "superport" image. At one time land cargo moved quickly to the nearest seaport to take best advantage of "FOB-U.S. port" rates for land transportation was costly. Containerization, however, provided the means for the vendor to participate in negotiated money saving ocean shipping rates. Containers offer protection to goods unequaled by other modes: the items are containerized at the beginning of their voyage and unpacked only at their final destination. There is less chance for damage due to handling or loss due to pilferage. With transportation companies able to shift a container by truck, rail, or ship, there is every advantage to shipping most goods by container.

Containerization allows the greatest use of intermodal transportation, and has helped create "superports." Superports are ports with a great many transportation links, like the "hub and spoke" concept employed by many large airlines. The port can offer better rates than can

other older or less developed ports because it moves high volumes of goods, and because it has the latest in transportation technology (containerization). The superport rates often include land transportation, supplied by its "feeder" transportation networks. The customer is no longer bound to use the nearest port; now he can ship to more distant ports while saving transportation fees and even getting his stock to his buyers faster than if he used the closer, but not so active port. [Ref. 6]

Intermodality has created a "mini-land bridge as a cooperative effort between rail and ocean carriers, allowing both to serve markets previously served by an all water route" [Ref. 6:p. 388]. As containerships grow larger, only the largest and best equipped ports can handle the larger draft ships and immense cargoes; smaller ports, and those not capable of the land bridge link will lose out to the newer, linked superports.

C. DEREGULATION

Deregulation allows rates to be set by negotiation and competition. Inland carriers working with ocean carriers create transportation systems that improve efficiency and allow them to compete intermodally:

> Point to point rates and through service proved to be a lucrative marketing device for many ocean/inland carrier combinations. It simplified the traffic managers [sic] problem while allowing the carriers to enter new markets. Pricing freedom, service contracts, load centers, etc., opened the gates to carrier competition on a scale never before heard of in the U.S. trades. As this competition

> heated up, the old market territory of the port quickly disappeared. [Ref. 6:p. 388]

Once the hinterlands supporting them dried up, smaller, less-trafficked ports lost their business to the new superports.

D. PORT SIZE

The size of ports which handle containerized cargo is dependent on the water depth needed to accommodate ships and on the staging areas needed to support the shiploads of containers. Port size also depends on the other modes of transportation terminating at the port to move the containers inland. Since containerized ports require much more area than breakbulk ports, older ports with no room to expand find themselves replaced by newer, more spacious ports: Oakland replaced San Francisco while the port of New York expanded into northern New Jersey.

E. PROBLEM AREAS

The port expansion due to containerization and deregulation presents a new problem to strategic sealift. Basically, a port exists to transfer goods from land to sea and vice versa. Fewer ports enable the enemy to be more successful at cutting supply lines. Since the ports best equipped to handle containerized vessels (the major portion of the U.S. merchant fleet) are the so-called superports, loss of them would make it very difficult to move containers rapidly. Some smaller ports would be unable to berth large

container vessels, as well as load/unload them without assistance. If not mined, blockaded, or destroyed, however, superports represent one of the best links in our national transportation system.

But the cost of these superports in terms of other lost ports is high: government shipping relies on the same ports as does private shipping. During wartime these ports will be unable to meet all demands. Also, some smaller ports will be unable to contend with very large vessels, forcing those vessels to remain at anchor away from the port (like current supertankers) while smaller vessels and craneships work to bring the cargo into (or out of) port, possibly during enemy action. While small RRF breakbulkers could use smaller ports in wartime, leaving the superports to the larger containerships, there is still a problem in that deteriorated, outmoded smaller ports will be less able to handle the shipping necessary to support the military effort. A strong sealift strategy will provide for alternate ports in wartime as well as in peacetime.

VI. SHIPBUILDING INDUSTRY

A. BACKGROUND

Shipbuilding is both a capital and a labor-intensive industry, and one that is cyclical with fluctuating demand. It is an important economic and defense asset. Unfortunately, however, shipbuilding in the United States seems to be in decline, with private yards closing or ceasing construction for lack of non-government contracts. Naval shipyards, originally created for repair and overhaul, are now doing more new construction, leaving private yards with even less to do. MARAD reported that in calendar year 1983, only 12 of the 654 ships completed worldwide were constructed in the United States. In FY84, eight new commercial ships were delivered [Ref. 4:p. 4]. Construction differential subsidies (CDS), once paid to encourage U.S.-flag ship operators to "buy American," have been cut to help ease national budget deficits. Thus there is little incentive to support the ailing U.S. shipbuilding industry by procuring new ships from it.

American shipyards are capable of building almost any type of ship, and modern techniques such as modular construction make it possible for even the oldest of yards to participate. However, shipbuilding is costly, and because "runs" of ships are not done continuously, it is

even more costly. Foreign shipyards typically keep their costs down by doing continuous runs of ships of one design. [Ref. 2]

In 1984 a Shipyard Mobilization Base (SYMBA) study identified 119 shipyards in the United States with potential national security value. Nine shipyards were government owned, and 110 were in the private sector. The Active Shipbuilding Industrial Base (ASIB) includes 23 major shipyards that account for almost one half of the total shipyard employment in the United States.

> Since 1982, the base date for the SYMBA study, 16 shipyards in the shipyard mobilization base have closed, either permanently or temporarily, while only one has been added. Four of these closures were in the ASIB. [Ref. 2:p. 71]

There is no doubt the U.S. shipbuilding industry is ailing, but it cannot get better on defense contracts alone [Ref. 2]. In fact, any further decline in the number of shipyards might affect the competitive base required for award of government contracts. Private sector purchases alone would help revitalize the industry.

B. LABOR

Labor is one of the main reasons for difficulties in the shipbuilding industry. Labor costs are high, yet the number of available jobs declines, forcing the cost of labor even higher as skilled labor seeks employment elsewhere. Because unions dominate the shipyard labor force, technological changes must be negotiated, costing both time and money:

> The U.S. shipyard industry is over 90 percent unionized. Avondale Shipyard is the one exception among the ASIB yards. The shipbuilding unions are characteristically craft unions, and, consequently, multiunion yards are the industry norm. Their influence has been considered largely prejudicial to maximizing productivity: the craft orientation has produced numerous demarcation disputes. More important, it prevents flexible use of labor, complicates planning and scheduling, and discourages career changes. [Ref. 7:pp. 104-105]

Add to this a high turnover rate and instability of employment in the industry [Ref. 4] and it is easy to see why labor is a force to be recognized as important to the industry's health.

C. SEALIFT IMPLICATIONS

A strong industrial base is an important part of strategic sealift. It seems, however, that not only is the U.S. merchant fleet declining but so is its shipbuilding industry. Either one could prove fatal, but the combination of the two can only make things more difficult.

> As important as the material support of the operating fleet in peacetime is, the most important characteristic of naval shipyards is their mobilization potential. World War II mobilization illustrates what mobilization requirements may be in the extreme: total shipyard employment increased tenfold between mid-1940 and the employment peak in 1943. However, a World War II mobilization experience is not envisioned in current plans. Present estimates are that a shortfall of 40,000 workers would exist at D day, with an additional 55,000 workers needed to reach a projected peak a year and a half after D day. This scenario assumes a global situation lasting about three years. It includes a buildup in both naval and private shipyards. [Ref. 2:p. 84]

MSC, recognizing the need to close this gap in military support capability, is attempting to replace old ships in the NDRF with more modern vessels. It is also modifying

containerships to allow them to carry oversized military equipment, and adding other features designed to enhance sealift capability. Finally, it is converting two tankers into hospital ships for the RRF. MSC cannot force commercial lines to utilize private shipyards, but its own programs to enhance strategic sealift assets can also help spur an already flagging industry. [Ref. 1]

VII. DECREASING U.S. MERCHANT FLEET

A. U.S. MERCHANT FLEET

The U.S. merchant fleet is slowly shrinking in number although new ships do replace old. This occurs because as older breakbulk ships are scrapped, they are replaced by newer, larger containerships. The newer ships, because they carry more cargo, often replace more than one retiring ship. Similarly, larger tankers replace more than one of the smaller, older variety. In addition, losses of U.S. government subsidies to U.S. merchant marine ships and their owners cause companies to purchase their vessels from foreign shipyards instead of American yards. Since most of the U.S. merchant fleet falls under the Jones Act (1920) which requires that vessels engaged in domestic trade be built in domestic yards, and since subsidies are no longer available, this means there are no incentives to build in U.S. shipyards, and hence more losses to the U.S. merchant fleet. As construction and labor costs increase, forcing owners to buy foreign ships and crews, the U.S. merchant fleet decreases in size.

B. EFFECTIVE U.S. CONTROL FLEET

The Effective U.S. Control Fleet (EUSC) consists of those ships owned by domestic sources but registered under other national flags. While there are agreements between

ship owners and the U.S. government and treaties between the U.S. government and foreign governments making these ships available to the U.S. in times of national emergency, there is always some question of whether these agreements and treaties would be upheld. The size of this fleet is comparable to the U.S.-flag fleet, but its total tonnage is much greater. In 1983, the total tonnage of the EUSC was more than twice the U.S.-flag fleet, with 85 percent of the tonnage in tankers and most of the remainder in dry-bulk and combination-bulk carriers [Ref. 7:p. 58]. The EUSC, like the U.S.-flag merchant force, is steadily shrinking as its older vessels are replaced with fewer larger, more efficient vessels. While MSC may be able to call upon EUSC vessels to augment forces obtained from U.S.-flag merchant sources, the smaller available supply and the uncertainty of promised availability makes this source somewhat unreliable.

C. FLAG OF CONVENIENCE

Flag of Convenience is a term used to describe the registration and operation of ships outside the owner's country. Generally these foreign countries have easier registration requirements and minimum taxes and regulations. Also, there is usually no requirement for the crew's nationality or a limitation on where the vessel may be built. Since flying the U.S. flag requires that the vessel be built in a U.S. shipyard and be crewed by an American

crew [Ref. 2], many owners take advantage of the flag of convenience to compete more economically in the world market. As American labor and production costs go up, however, the cost of maintaining a U.S.-flag fleet also goes up. Without government intervention in the form of subsidies or fewer requirements concerning ship origin or crew nationality, a U.S.-flag fleet may become impossible to maintain. MSC may call on ships flying flags of convenience (the EUSC fleet covered under treaty) in times of national emergency, but their availability is open to question. Moreover, since this fleet is mostly composed of tankers and bulk vessels it is not as useful a source for a strategy requiring vessels more along the lines of self-contained breakbulk or RO/RO vessels.

D. AGE OF THE MERCHANT FLEET

The U.S.-flag fleet is an aging one. A significant portion (59%) of the 1983 total fleet was 15 years old or older. This included 91% of the breakbulk/partial container vessels and 61% of the tankers for that year. In these two categories, replacements are usually not made on a one-for-one basis as the new vessels tend to be larger. In addition, the breakbulk ships tend to be replaced by container ships, which also means that pierside cranes or crane ships are then needed to assist in the loading/unloading. These containerships also may not be in the best interests of strategic sealift, although they may

help the economic survival of the merchant fleet on a commercial basis.

MSC has a double problem with an aging fleet: it must rely on the U.S.-flag fleet for support in national emergency, and it must rely on an NDRF whose assets may be even less capable. To combat this problem, MSC is trying to update the NDRF with the strategically required self-contained breakbulk ships and by adding high-speed converted containerships to the RRF. Also, MSC supports the merchant fleet by shipping all but certain military items on commercial U.S. lines. [Ref. 1]

VIII. DEREGULATION

A. BACKGROUND

Regulation of transportation modes began as a means of controlling "monopolies" and large carriers and for ensuring that smaller businesses had a chance to compete. It also helped ensure that "captive" customers would pay a fair price for services received. As time went on and alternative transportation modes increased, regulation helped balance the market share between the modes, ensuring the survival of each. And regulation helped promote the national interest, too, by including subsidies or penalties to force market participants to change behavior.

The shipping industry is governed by a host of regulations, some related to shipping itself and some related to other connected industries or other transportation modes. Regulations governing ports and waterways, pollution control, customs fees, etc., also affect the shipping industry. Many regulations exist specifically to aid shipping. Subsidies and other forms of aid also support the industry.

With the coming of deregulation in recent years, whole new concepts of transportation are emerging. Competition is now at its keenest, and companies are fighting to establish themselves in markets previously prohibited to them. The

effects of deregulation in the other transportation modes are now beginning to affect ocean shipping and the merchant fleet.

B. DEREGULATION

The Shipping Act of 1984 and the resulting deregulation in rail shipping made possible world transportation service, for a company could now ship to the port of its choice instead of to the nearest port. The ocean shipping lines were free to negotiate with land transportation lines so they could offer package deals which included land transportation at much lower rates than was previously possible. This benefited the ocean lines since they required more cargo for their newer, larger containerships, and benefited the ports since they received more traffic which required the pierside cranes needed to service the containerships. At least one company (CSX) also took advantage of deregulation in all modes by creating a company with vehicles in all modes. That company can boast service potential that others can only approximate. [Ref. 5]

The new cooperation between modes encouraged by deregulation offers strategic sealift benefits as well as problems. If deregulation aided the growth of fewer, but larger "superports," it also created a stronger climate for inter-modal growth. Containers that can be pulled by truck, hauled by train, or shipped by ocean vessel offer more possibilities for use than items that fit one system only.

While this growth in the use of containers currently presents handling problems for MSC, containerization will eventually be one of the mainstays of defense strategy. In addition, deregulation, by creating mini-bridge (seaport to seaport land transportation) and micro-bridge (inland city to seaport land transportation) situations actually speeds up transfer of goods. This is always a welcome event, especially during national emergencies. Mini-bridge and micro-bridge shipments also help develop and strengthen transportation network ties which could benefit MSC in the event of the loss of a seaport.

IX. A-76 LEGISLATION

A. BACKGROUND

OMB Circular A-76 reiterates the policy that the federal government uses, not creates, business enterprises. Any service that can be performed by commercial sources should not be performed by government offices. This legislation calls for each activity or command to review its functions for possible contracting out. Functions identified as commercial activities (CA) are costed out and compared to contractor bids from private industry. The CA is then awarded to the lowest bid. If the CA remains in-house the government continues to perform the function. If the CA is contracted out, however, the civilian positions with the government are eliminated and the contractor takes over performance of the function. Performance review ensures the contractor's cooperation and work completion, and in the event of inadequate performance, can result in return of the CA function to government operation. [Ref.2]

B. APPLICATIONS

MSC complies with A-76 legislation as much as possible. MSC's Annual Report for 1984 [Ref. 1:p. 34] listed "several categories of point-to-point and special mission ships, including the four oceanographic research and nine ocean surveying ships," as CA ventures that were contracted out.

There are also plans to study the possibility of contracting out other special mission ships such as missile range instrumentation ships, navigation test support ships, and underseas surveillance ships. The newly converted hospital ships may also have their medical staff provided by contract.

Since mission essential work is exempt from A-76 legislation, MSC can only look at its non-mission essential operations. Obviously there is a very fine line between these categories in MSC's case: just when a special mission ship becomes essential is hard to determine. In any case, there is a limited pool of mariners available for either the Civil Service or the contractor to draw from. Contracted out services always leave open the question of possible strikes, in addition to problems with security.

A-76 has created some problems for shipyards. While shipyards may not be under MSC's control these problems do affect the possible readiness of its fleet. The case has been made that naval shipyards could be contracted out in a piecemeal fashion under this legislation [Ref. 2:p. 86]. Since the naval shipyards are the ones doing the majority of work in an already dying industry, this could have a severe impact on strategic sealift in the long run.

X. PREPOSITIONED SHIPS AND FSS

A. PREPOSITIONED SHIPS

Prepositioning equipment and supplies provides flexibility and readiness to strategic sealift. Since prepositioning equipment and supplies generally requires the cooperation of a host nation, prepositioning at sea would negate any politically related problems and also allow for easy movement of material from place to place to meet different threats. The Near Term Prepositioning Force (NTPF) and its replacement, the Maritime Prepositioning Ships (MPS) program, established dedicated sealift and prepositioning at sea in a region without mainland staging sites for military units. [Ref. 1]

With the NTPF, the U.S. can deploy troops and sustain them in the field for up to 30 days. In a crisis situation, troops are airlifted to the operational theater and join their prepositioned supplies and equipment aboard the prepositioned ships which can then shift location as the situation warrants.

When not activated, prepositioned ships remain on station (docked or anchored with reduced crew) while crew members are rotated periodically. The ships may also participate in different readiness exercises. The equipment and supplies on board are periodically rotated and checked

to ensure proper working condition. The crew members are civilian mariners, either employed by MSC as Civil Service employees or by the contractor operating the ship for MSC. This is a two-fold blessing for MSC: operational costs are lower than operating with a full crew, and the existing pool of civilian mariners has its skills honed. [Ref. 1]

B. SL-7 FAST SEALIFT SUPPORT

Fast Sealift Support (FSS) is a concept closely aligned to prepositioning fully loaded ships, except that FSS relies on quick response time as its contribution to strategic sealift. FSS ships are berthed near the troops they support, maintained by a contractor in a status that enables them to be fully activated within 96 hours. These ships are not operated in peacetime except for 30 days of training per year, and have no full-time crews assigned. [Ref. 1]

The mainstay of the FSS program is the SL-7 class containership. SL-7's can maintain a speed of 33 knots, making them the fastest ships in the U.S. merchant fleet. But their great speed is a two-edged sword: they are also huge consumers of precious fuel. In crisis, however, the ability to lend fast support far outweighs the cost of the fuel required, and their size allows them to haul much oversized and heavy equipment. Converted to RO/RO vessels with some remaining container capacity, SL-7's are extremely versatile additions to the RRF. With the SL-7's it has placed in the RRF, and the prepositioned ships it has placed

on station, MSC has given strategic sealift greater flexibility than was previously possible, and has greatly enhanced its readiness posture.

XI. SHIP ACQUISITION

A. BACKGROUND

Any mobilization facing our country will involve sealift, for it is the best method available to us for transporting the huge quantities of equipment and material required. Prepositioning ships and material relieves, somewhat, the immediate need for transporting necessary items to the area of conflict, but it does not eliminate the need for continuing support. The recent provision of fast support ships to be held ready for mobilization will help supply that need. Any other support will have to come from the ships in the mothball fleet, which, however, are no longer particularly suitable for service in a world of totally different technology. Alternatives to correct this situation include buying existing working vessels for the MSC fleet, and building ships for the reserve fleet.

B. ACQUISITION PROGRAMS

Acquiring sealift, prepositioning, and ready reserve ships in an era of tight budgets has brought about some new methods of acquisition management. Some ships needed for sealift are now contracted for, as opposed to being purchased. However, this method has problems since our own merchant fleet is gradually shrinking in number, resulting in a lessening available pool of needed ship types. The

pool may grow if laws requiring U.S. flag ships to be built in the U.S. and manned by U.S. citizens are changed.

Another method of ensuring adequate ship availability, that of government building of ships for lease, requires huge outlays of cash and still cannot guarantee enough ships because there are so few U.S. shipyards and they are so expensive that they are almost exclusively engaged in the manufacture of military vessels. Moreover, their work schedules seem to be so chronically delayed that time alone makes construction of merchant ships even more unlikely. Another factor, the changing configuration of the U.S. merchant fleet, makes it even more difficult for the Navy to contract ships even for sealift needs.

When containerization revolutionized the shipping industry, it also encouraged growth in size of containerships as well as reducing their self-supportability. Huge containerships lacking their own cranes for off-loading are not very useful for military purposes when small, undeveloped port areas are projected as the likely places these ships will call under hostile conditions. Moreover, military equipment often does not fit properly into containers, and so this creates still another problem to overcome. The final solution, at least for now, has been construction and conversion of ships specifically to meet the needs of a prepositioned force that meets military requirements and provides adequate speed for transit. In

all this, however, keeping down costs is a major consideration.

C. FUNDING

Getting funding for MSC projects is oftentimes difficult. Monies granted do not match monies requested. For example, in FY83,

> The Navy requested $322,600,000 for the conversion of four T-AKRX Fast Logistics Ships (SL-7s). In conformance with previous Committee direction with respect to the Fast Logistic Ship Program, the Committee recommends $44,000,000 to procure the long lead material for the remaining four T-AKRX ships. The Committee's recommendation represents a reduction of $278,600,000 from the budget request. [Ref. 8:p. 21]

Such cuts, especially if continued, can severely cripple MSC programs, as well as overall Navy growth and maintenance. To avoid such situations, great emphasis is placed on competition as a means of achieving cost savings throughout the acquisition process. Emphasis on competition also seems to aid with time savings as well, a tremendous help in a period of fiscal constraint and shaky industrial base. This competition is fostered by second sourcing programs and may also be helping to keep the industrial base alive, for the remaining shipyards have been making substantial investments to improve their yards so as to win government contracts [Ref. 9:p. 12]. Competition is used very well by MSC to enhance the nation's strategic sealift capabilities:

> During the fiscal years from 1982 through 1989, approximately $5.4 billion will be spent for new ship construction and conversion under Navy Sealift programs. At least eight different U.S. shipyards will share in this

> work, as will scores of component manufacturers and shipyard suppliers. During the same period, approximately $13.4 billion will be paid to ship operators for the operation and maintenance of sealift ships for the Navy. [Ref. 1:p. 42]

MSC's success with competition makes it clear that it is possible to survive even in an austere fiscal climate. Moreover, such competition assures us that readiness is possible, even where it formerly seemed difficult.

XII. SUMMARY

A. STRATEGIC MOBILITY REQUIREMENTS

Strategic mobility is divided into three basic elements: airlift, sealift, and prepositioning supplies and equipment. MSC is responsible for sealift, and also plays a major role in the prepositioning of ships and equipment. Although MSC's primary mission is strategic sealift and the prepositioning of ships and equipment, its everyday functions are to provide sealift for DOD cargoes and to support the U.S. Naval fleet. Through its programs, MSC provides flexibility and increased readiness to strategic mobility.

B. PROBLEMS FACING MSC

There are many problems facing MSC in its mission accomplishment: it is a time of austere funding, deregulation, high labor costs, and much union disagreement. The U.S. shipbuilding industry is declining, as are the numbers of the U.S. merchant fleet, which is also moving from smaller, self-contained vessels to larger, non-self-contained vessels. A-76 legislation is seeking to contract out all sorts of commercial type activities, and ports are growing larger with the intermodal capabilities obtainable by containerization. The world shipping market is growing more competitive, and overcapacity runs rampant in the

industry. Despite all these obstacles, MSC is maintaining continual readiness while providing the most flexible strategic sealift possible.

C. MSC SOLUTIONS

In the face of so many obstacles, MSC has prepared a few countermeasures to deal most effectively with its multiple problem areas. Prime among these is updating the NDRF by the addition of breakbulk ships, crane ships, and SL-7's to the RRF. This gives an aging "fleet" some much-needed sealift capability as well as speed for second-wave wartime shipping. Of equal importance is the new MPS program, which extends both readiness and sealift capability. Careful pursuit of competitive contracts in both shipbuilding and conversion projects as well as in charters helps keep related maritime industries functioning, and cuts government costs as well. Developing and using sea sheds and flat racks allows MSC to make use of containerships for shipping military cargoes.

All of these measures, with their many smaller components, serve to accomplish MSC's mission of strategic sealift, providing it with increased flexibility and a stronger readiness posture. Strategic sealift under MSC's new tactics better approaches the intent of the national strategy toward surge capability and sustainability in fighting a war. These tactics also enable MSC to better

control its assets and emphasize the potential military usefulness of a strong merchant marine.

APPENDIX A

ACRONYMS

ASIB	Active Shipbuilding Industrial Base
CA	Commercial Activity
CCF	Capital Construction Fund
CDS	Construction Differential Subsidy
CIVMAR	Civil Service Mariners
DOD	Department of Defense
DWT	Deadweight Tons
EUSC	Effective U.S. Control Fleet
FSS	Fast Sealift Support
LASH	Lighter Aboard Ship
LNG	Liquefied Natural Gas (carrier)
MAC	Military Airlift Command
MARAD	Maritime Administration
MLSF	Mobile Logistic Support Force
MPS	Maritime Prepositioning Ships (Program)
MSC	Military Sealift Command
MTMC	Military Traffic Management Command
NDRF	National Defense Reserve Fleet
NFAF	Naval Fleet Auxiliary Force
NTPF	Near Term Prepositioning Force
ODS	Operating Differential Subsidy
OMB	Office of Management and Budget
RDF	Rapid Deployment Force
RO/RO	Roll on/Roll off (carrier)
RRF	Ready Reserve Fleet
SRP	Sealift Readiness Program
SYMBA	Shipyard Mobilization Base Study
TEU	Twenty-foot Equivalent Unit (container)
UNREP	Underway Replenishment

APPENDIX B

NATIONAL DEFENSE RESERVE FLEET
1945-1984

Fiscal Year	Ships	Fiscal Year	Ships
1945	5	1965	1594
1946	1421	1966	1327
1947	1201	1967	1151
1948	1675	1968	1062
1949	1934	1969	1017
1950	2277	1970	1027
1951	1767	1971	860
1952	1853	1972	673
1953	1932	1973	541
1954	2067	1974	487
1955	2068	1975	419
1956	2061	1976	348
1957	1889	1977	333
1958	2074	1978	306
1959	2060	1979	317
1960	2000	1980	320
1961	1923	1981	317
1962	1862	1982	303
1963	1819	1983	304
1964	1739	1984	386

Source: [Ref. 4:p. 38]

APPENDIX C

NATIONAL DEFENSE RESERVE FLEET
30 SEP 84

Fleet Sites	Retention[1]	Scrap Candidates	Special Programs	Total
James River, VA	115	9	25	149
Beaumont, TX	55	0	103	158
Suisun Bay, CA	74	0	5	79
Total	244	9	133	386

[1]Vessels maintained for emergency activation under the fleet preservation program

Source: [Ref. 4:p. 38]

APPENDIX D

MAJOR MERCHANT FLEETS OF THE WORLD
30 SEP 84

Country	No. of Ships[1]	Rank by No. of Ships[2]	Deadweight Tons	Rank by Deadweight Tonnage
Liberia	2,019	4	131,545,000	1
Greece	2,454	3	68,612,000	2
Japan	1,712	5	61,191,000	3
Panama	3,290	1	57,781,000	4
Norway	529	11	32,470,000	5
United Kingdom	685	7	27,251,000	6
U.S.S.R.	2,497	2	23,157,000	7
United States (Privately owned)	538	10	21,569,000	8
France	314	20	16,532,000	9
Italy	601	8	14,964,000	10
China (People's Republic of)	861	6	12,628,000	11
Singapore	556	9	11,634,000	12
Spain	511	12	10,765,000	13
Korea (Republic of)	499	13	10,585,000	14
British Colonies	309	21	10,200,000	15
All Others[3]	8,204		155,520,000	
Total	25,574		666,404,000	

[1]Ocean going merchant ships of 1,000 gross tons and over.

[2]By no. of ships, Cyprus ranked 14th--with 480 vessels aggregating 8,110,000 dwt, and Netherlands ranked 15th--with 448 vessels aggregating 7,040,000 dwt.

[3]Includes 250 United States Government-owned ships of 2,840,000 dwt.

Source: [Ref. 4:p. 12]

APPENDIX E

U.S. OCEANGOING MERCHANT MARINE[1]
30 SEP 84

Vessel Type[2]	Privately Owned No. Ships	Privately Owned DWT (000)	MARAD Owned No. Ships	MARAD Owned DWT (000)	Total No. Ships	Total DWT (000)
Active Fleet:						
Passenger/ Passenger-Cargo	5	43	4	32	9	75
General Cargo	49	731	5	32	54	763
Intermodal	116	2,671	0	0	116	2,671
Bulk Carriers	22	999	0	0	22	999
Tankers	205	11,930	2	21	207	11,951
Total Active	397	16,374	11[3]	85	408	16,459
Inactive Fleet:						
Passenger Passenger-Cargo	1	6	24	187	25	193
General Cargo	20	251	194	2,174	214	2,325
Intermodal	29	545	5	83	34	628
Bulk Carriers	3	122	0	0	3	122
Tankers	51	3,823	14	315	65	4,138
Total Active	104	4,747	237	2,759	341	7,506
Total Active and Inactive:						
Passenger/ Passenger-Cargo	6	49	28	219	34	268
General Cargo	69	982	199	2,206	268	3,188
Intermodal	145	3,216	5	83	150	3,299
Bulk Carriers	25	1,121	0	0	25	1,121
Tankers	256	15,753	16	336	272	16,089
Total American Flag	501	21,121	248[4]	2,844	749	23,965

(Continued)

[1]Vessels of 1,000 gross tons and over, excluding privately owned tugs, barges, etc.

[2]Bulk carriers including tug barges; Tankers including tanker barges and liquified natural gas carriers.

[3]Includes 6 vessels in custody of other agencies.

[4]Includes National Defense Reserve Fleet which consists of 228 ships, of which 8 are scrap candidates; 2 vessels are in baseboat charter.

Note: Tonnage figures may not add due to rounding.

Source: [Ref. 4:p. 10]

EMPLOYMENT OF U.S. FLAG OCEANGOING FLEET[1] 30 SEP 84

Status and Area of Employment	Passenger Pass/Cargo		General Cargo		Inter-modal		Bulk Carriers		Tankers		TOTAL	
	#	DWT(000)	#	DWT(000)	#	DWT(000)	#	DWT(000)	#	DWT(000)	#	DWT(000)
Active Vessels												
Foreign Trade												
Total	3	29	33	503	74	1,924	6	435	24	1,429	140	4,320
Nearby Foreign[2]	-	-	-	-	2	18	-	-	1	37	3	55
Great Lakes-- Seaway Foreign	-	-	-	-	-	-	-	-	-	-	-	-
Overseas Foreign	3	29	33	503	72	1,906	6	435	23	1,392	137	4,265
Foreign to Foreign	-	-	-	-	5	90	1	127	14	895	20	1,112
Domestic Trade												
Total	2	14	1	18	25	393	13	388	142	8,793	183	9,606
Coastwise	-	-	-	-	-	-	5	148	25	1,170	30	1,318
Intercoastal	-	-	-	-	-	-	6	184	70	2,840	76	3,024
Noncontiguous	2	14	1	18	25	393	2	56	47	4,783	77	5,264
Other U.S. Agency Ops. Total	4	32	20	242	12	264	2	49	27	834	65	1,421
MSC Charter	-	-	15	210	12	264	2	49	25	813	54	1,336
B.B. Charter & Other Custody	4	32	5	32	-	-	-	-	2	21	11	85
TOTAL ACTIVE	9	75	54	763	116	2,671	22	999	207	11,951	408	16,459
Inactive Vessels												
Temporarily Inactive	-	-	-	-	4	87	1	82	4	202	9	371
Laid-Up (Privately Owned)	1	6	18	227	23	372	2	40	47	3,621	91	4,266
Laid-Up (Privately Owned/ NDRF)	-	-	2	24	2	86	-	-	-	-	4	110

	Passenger Pass/Cargo		General Cargo		Inter-modal		Bulk Carriers		Tankers		TOTAL	
	#	DWT(000)	#	DWT(000)	#	DWT(000)	#	DWT(000)	#	DWT(000)	#	DWT(000)
Laid-Up (MARAD-Owned) Pending Disposition[3]	2	19	7	80	-	-	-	-	-	-	9	99
National Defense Reserve Fleet	22	168	187	2,094	5	83	-	-	14	315	228	2,660
TOTAL INACTIVE	25	193	214	2,425	34	628	3	122	65	4,138	341	7,506
GRAND TOTAL	34	268	268	3,188	150	3,299	25	1,121	272	16,089	749	23,965

[1]Excludes vessels operating exclusively on the inland waterways and Great Lakes, those owned by the U.S. Army and Navy, and special types such as tugs, cable ships, etc.

[2]Nearby foreign trade includes Canada, Mexico, Central America, West Indies, and North Coast of South America.

[3]Other than vessels in the NDRF.

Source: [Ref. 4:p. 11]

U.S. OCEANBORNE FOREIGN TRADE/COMMERCIAL CARGO CARRIED

Tonnage (Millions)

Calendar Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Total tons	628.9	615.6	698.8	775.3	775.6	823.1	772.2	760.0	675.5	630.4
U.S.-flag tons	40.9	31.4	33.8	34.8	32.1	35.0	28.2	34.2	31.1	36.7
U.S. percent of total	6.5	5.1	4.8	4.5	4.1	4.2	3.7	4.5	4.6	5.8
Liner total tons	51.4	44.3	49.8	47.8	56.5	57.0	59.3	60.0	54.5	56.8
Liner U.S.-flag tons	15.3	13.6	15.4	14.4	16.0	15.7	16.2	16.5	14.3	14.0
Liner U.S. Percent	29.8	30.7	30.9	30.2	28.3	27.5	27.3	27.6	26.2	24.6
Non-liner total tons	282.7	275.3	289.6	289.0	308.8	342.7	356.7	365.6	335.8	317.7
Non-liner U.S.-flag tons	5.0	3.8	4.9	5.7	4.5	3.6	4.1	4.5	3.3	4.8
Non-liner U.S. percent	1.8	1.4	1.7	2.0	1.5	1.0	1.2	1.2	1.0	1.5
Tanker total tons	294.8	296.0	359.4	438.6	410.3	423.4	356.3	334.4	285.3	256.0
Tanker U.S.-flag tons	22.5	14.0	13.6	14.6	11.6	15.7	7.9	13.2	13.5	17.9
Tanker U.S. Percent	7.0	4.7	3.8	3.3	2.8	3.7	2.2	3.9	4.7	7.0

Value ($ Billions)

Total value	124.2	127.5	148.4	171.2	195.8	242.1	294.3	315.4	281.2	267.4
U.S.-flag value	22.0	22.4	26.4	28.0	30.7	35.7	42.3	47.0	43.5	43.0
U.S. percent of total	17.7	17.5	17.8	16.4	15.7	14.7	14.4	14.9	15.5	16.1
Liner total value	63.4	64.0	75.8	82.3	99.9	117.6	136.9	148.0	140.6	139.6
Liner U.S.-flag value	19.4	20.0	23.9	25.2	28.6	32.5	39.2	41.7	39.1	37.9
Liner U.S. Percent	30.6	31.2	31.6	30.7	28.6	27.6	28.7	28.1	27.8	27.2

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Non-linear total value	34.7	36.6	38.2	42.7	52.5	62.0	74.1	81.0	72.0	69.8
Non-liner U.S.-flag value	.8	1.0	1.1	1.2	1.0	1.1	1.3	1.9	1.2	1.2
Non-liner U.S. Percent	2.3	2.8	2.8	2.8	1.8	1.7	1.8	2.3	1.7	1.7
Tanker total value	26.0	26.9	34.4	46.2	43.4	62.5	83.3	86.4	68.5	58.0
Tanker U.S.-flag value	1.8	1.4	1.4	1.6	1.1	2.1	1.8	3.4	3.2	4.0
Tanker U.S. Percent	6.9	5.1	4.2	3.5	2.7	3.4	2.1	3.9	4.7	6.8

NOTE: Table includes Government-sponsored cargo; excludes U.S./Canada translakes cargoes and certain Department of Defense cargoes.

Source: [Ref. 4:p. 13]

APPENDIX H

MARITIME WORKFORCE AVERAGE MONTHLY EMPLOYMENT

	FY 83	FY 84
Seafaring Shipboard Jobs:	20,695	19,193
Shipyards[1]:		
Production Workers	84,713	82,976
Management and Clerical	21,733	22,096
Total	106,446	105,072
Longshore:	34,727	32,116

[1]Commercial yards in the Active Shipbuilding Base, constructing new ships and/or seeking new construction orders

Source: [Ref. 4:p. 36]

APPENDIX I

SHIPYARDS IN THE ACTIVE SHIPBUILDING INDUSTRIAL BASE (ASIB) 1985

Shipyard	Location
Alabama Drydock and Shipbuilding	Mobile, AL
Avondale Corporation	New Orleans, LA
Bath Iron Works	Bath, ME
Bay Shipbuilding	Sturgeon Bay, WI
Bethlehem Steel	Sparrows Point, MD
Equitable Shipyards	New Orleans, LA
General Dynamics/Electric Boat	Groton, CT
General Dynamics	Quincy, MA
Halter Marine	New Orleans, LA
Ingalls Shipbuilding	Pascagoula, MS
Lockheed Shipbuilding	Seattle, WA
Marinette Marine	Marinette, WI
National Steel and Shipbuilding	San Diego, CA
Newport News Shipbuilding	Newport News, VA
Norfolk Shipbuilding	Norfolk, VA
Pennsylvania Shipbuilding	Chester, PA
Peterson Builders	Sturgeon Bay, WI
Tacoma Boatbuilding	Tacoma, WA
Tampa Shipyards	Tampa, FL
Todd Shipyards	Galveston, TX
Todd Pacific Shipyards	Los Angeles, CA
Todd Pacific Shipyards	San Francisco, CA
Todd Pacific Shipyards	Seattle, WA

Source: [Ref. 2:p. 60]

APPENDIX J

SHIPBUILDING COST INCREASES 1975-80

	U.S. dollars			Percent change from 1975-80 national currencies	
	1975	1980	% of change	Labor	Material
United States	$5.47	8.59	57	57%	52%
Japan	3.57	5.76	61	26	29
West Germany	4.34	8.26	90	38	23
Netherlands	4.21	7.43	76	37	89
Sweden	5.62	7.81	39	41	55
United Kingdom	3.12	5.86	88	81	48

Source: [Ref. 7:p. 105]

APPENDIX K

REDUCTIONS IN FORCE, NAVAL SHIPYARDS MANDATED FOR 1985

Shipyard	Empls. 2/28	Proj. RIFs	Total Red.	Empls. 12/31
Charleston	8,601	145	251	8,350
Long Beach	6,895	400	1,295	5,600
Mare Island	10,028	150	328	9,700
Norfolk	13,327	250	1,027	12,300
Pearl Harbor	6,778	550	628	6,150
Philadelphia	11,373	512	1,113	10,260
Portsmouth	8,528	225	228	8,300
Puget Sound	12,387	200	687	11,700
TOTAL	77,917	2,432	5,557	72,360

Source: [Ref. 2:p. 87]

APPENDIX L

THE EFFECTIVE U.S. CONTROL FLEET (EUSC) DEC 82

	No. Ships	000 DWT	Average 000 DWT
Total	466	47,221.8	101.33
General Cargo	73	525.7	7.20
Breakbulk/reefer	52	223.4	6.43
Containership	10	25.5	2.55
RO/RO	6	35	5.83
Barge Carriers	5	130.8	26.16
Bulk	106	6,466.6	61.01
General Bulk	76	3,537.9	97.62
Combination, ore/bulk/oil	30	2,928.7	97.62
Tanker	259	39,426.7	152.23
Special Product/LNG	27	793.3	29.38
Passenger	1	9.9	9.90

Source: [Ref. 7:p. 58]

APPENDIX M

U.S.-FLAG PRIVATELY OWNED MERCHANT FLEET[1]
1 JAN 83

	No. of Ships	Deadweight Tons (DWT)
General Cargo	240	4,312,153
Breakbulk/partial container	104	1,404,688
Containership	97	1,868,274
RO/RO--vehicle carriers	18	274,043
Barge carriers	21	765,148
Bulk Cargo	18	618,018
Tankers	233	14,220,469
Special Products/liquified natural gas (LNG)	33	1,601,551
Other (coastal, passenger)	17	110,396
TOTAL	541	20,862,587

[1]Oceangoing ships 1,000 gross tons and over

Source: [Ref. 7:p. 58]

APPENDIX N

AGE DISTRIBUTION U.S.-FLAG PRIVATELY OWNED FLEET 1 JAN 83

	Total Ships	Under 5 yrs	5-9 yrs	10-14 yrs	15-19 yrs	20-24 yrs	25 yrs and Over
Total all ships	541	59	72	81	70	93	161
General Cargo	240	24	18	48	56	54	40
Breakbulk/ partial container	104	1	1	7	45	47	3
Container-ship	97	19	3	32	9	7	37
RO/RO	18	2	8	6	2	0	0
Barge carriers	21	2	6	13	0	0	0
Bulk Cargo	18	4	3	2	0	1	8
Tankers	233	17	44	28	11	37	96
Special products/ LNG	33	11	7	3	1	2	9
Other (coastal, passenger)	17	3	0	0	2	4	8

Source: [Ref. 7:p. 58]

LIST OF REFERENCES

1. Military Sealift Command, 1984 Annual Report.

2. Whitehurst, Clinton H., Jr., The U.S. Shipbuilding Industry: Past, Present, and Future (Annapolis, MD: Naval Institute Press, 1986).

3. Frump, Robert R., "The Maritime World in 1985," U.S. Naval Institute Proceedings (Vol. 112/5/999, May 1986).

4. U.S. Department of Transportation, MARAD '84: The Annual Report of the Maritime Administration for Fiscal Year 1984, June 1985.

5. Organisation for Economic Co-Operation and Development, Maritime Transport 1984 (Paris: 1985).

6. Foggin, James H., and Gary N. Dicer, "Disappearing Hinterlands: The Impact of the Logistics Concept on Port Competition," Transportation Research Forum Proceedings (Vol. XXVI, No. 1, 1985, pp. 385-390).

7. Office of Technology Assessment, Congress of the United States, An Assessment of Maritime Trade and Technology, 1983.

8. Bowen, Alva M., and Stanley J. Heginbotham, "Defense Budget--FY83: Navy Shipbuilding Issues," Congressional Research Service (CRS) Issue Brief No. IB82031, updated 7 JAN 83.

9. Bryan, VADM C.R., "Statement on Shipbuilding and Shipyards, Before Subcommittee on Seapower, House Armed Services Committee," delivered on 28 FEB 79, The Observer, Vol. III, No. 11, 15 MAR 79.

BIBLIOGRAPHY

Alden, John D., "Tomorrow's Fleet," U.S. Naval Institute Proceedings, Vol. 112/5/999, May 1986, pp. 201-208.

Brown, Peter J., "The Second Gap in Strategic Sealift," U.S. Naval Institute Proceedings, Vol. 112/12/1006, December 1986, pp. 93-95.

Collins, John M., and Elizabeth Ann Severns, "U.S.-Soviet Military Balance, Book IV. Airlift and Sealift," Congressional Research Service Report No. 80-164S, July 1980.

Crew, James G., and Kevin H. Horn, "The Evolving Functions of U.S. Gulf Coast Ports," Transportation Research Forum Proceedings, Vol. XXVI, No. 1, 1985, pp. 152-160.

Daniel, Marshall E., Jr., Defense Transportation Organization: Strategic Mobility in Changing Times, Washington, D.C.: National Defense University Research Directorate, 1979.

Frankel, Ernst G., Regulation and Policies of American Shipping, Boston, MA: Auburn House Publishing Co., 1982.

Gannon, Edmund J., and Alva M. Bowen, "Naval Shipbuilding Costs: A Projection," Congressional Research Service Report No. 79-139F, 28 June 1979.

Gary, William F., National Transportation Statistics, Cambridge, MA: U.S. Department of Transportation, September 1980.

Heine, Irwin M., The United States Merchant Marine: A National Asset, Washington, D.C.: National Maritime Council, 1976.

Jansson, Jan Owen, and Dan Shneerson, Port Economics, Cambridge, MA: MIT Press, 1982.

Kendall, Lane C., "U.S. Merchant Marine in 1985," U.S. Naval Institute Proceedings, Vol. 112/5/999, May 1986, pp. 56-59.

Komer, Robert W., Maritime Strategy or Coalition Defense? New York: University Press of America, 1984.

Milano, Vito R., et al., Defense and Economic Aspects of HR-1242 (Competitive Shipping and Shipbuilding Act of 1983), Alexandria, VA: Center for Naval Analysis, June 1983.

Mitchell, Douglas D., "Shipbuilding Costs for General Purpose Forces in a 600-Ship Navy," Congressional Research Service Report No. 82-23F, 16 February 1982.

Molefsky, Barry, "Inflationary Consequences of the Defense Buildup," Congressional Research Service Mini Brief No. MB81256, updated 3 February 1983.

Naval Education and Training Program, Military Sealift Command, U.S. Government Printing Office, 1984.

O'Neil, W.D., "Executing the Maritime Strategy," U.S. Naval Institute Proceedings, Vol. 112/12/1006, December 1986, pp. 39-41.

Organization for Economic Co-Operation and Development, Maritime Transport 1983, Paris: 1984.

Sek, Lenore, "Recent Developments in Maritime Assistance Programs," Congressional Research Service Report No. 83-208E, 23 November 1983.

Sek, Lenore, "Regulation of U.S. Ocean Shipping: Background and Considerations for Reform," Congressional Research Service Report No. 82-124E, 1 July 1982.

Tarpgaard, Peter T., U.S. Shipping and Shipbuilding: Trends and Policy Choices, Congress of the United States, Congressional Budget Office, August 1984.

U.S. Department of Defense, Office of the Coordinator of Shipbuilding, Conversion and Repair, Annual Report on the Status of the Shipbuilding and Ship Repair Industry of the United States, 1776, Washington, D.C.: April 1977.

U.S. Naval Institute, The Maritime Strategy, Monoprint of the U.S. Naval Institute, January 1986.

Wasielewski, Philip G., "Sea Power and Counterinsurgency," U.S. Naval Institute Proceedings, Vol. 112/12/1006, December 1986, pp. 62-66.

Whitehurst, Clinton H., Jr., The Defense Transportation System: Competitor or Complement to the Private Sector? Washington, D.C.: American Enterprise Institute for Public Policy Research, 1976.

Wootten, James P., "Defense Budget--FY83: Strategic Mobility (Airlift and Sealift)," Congressional Research Service Issue Brief No. IB82035, updated 14 December 1982.

Wootten, James P., "Regional Support Facilities for the Rapid Deployment Force," Congressional Research Service Report No. 82-53F, 25 March 1982.

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