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COST SAVINGS AND OTHER BENEFITS FROM TRANSFERRING NAVY FAST COMBAT SUPPORT SHIPS TO THE NAVAL FLEET AUXILIARY FORCE

by

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March 1997

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The U.S. Navy's Fast Combat Support Ships (AOEs), which are the largest and most powerful logistics ships in the world, are designed to meet all of the logistical needs of an Aircraft Carrier Battle Group. Without an AOE, a battle group would lack the logistics support that it requires to perform its critical missions of global presence, power projection and sea control. Yet today, battle groups must perform these missions with smaller budgets than in the past. To relieve some of this fiscal pressure, the AOEs could be transferred to the Military Sealift Command's Naval Fleet Auxiliary Force (NFAF), whose civilian-crewed ships operate at a lower cost than Navy ships. Transferring the AOEs to the NFAF could save an estimated $140 million per year.

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ABSTRACT

The U.S. Navy's Fast Combat Support Ships (AOEs), which are the largest and most powerful logistics ships in the world, are designed to meet all of the logistical needs of an Aircraft Carrier Battle Group. Without an AOE, a battle group would lack the logistics support that it requires to perform its crucial missions of global presence, power projection and sea control. Yet today, battle groups must perform these missions with smaller budgets than in the past. To relieve some of this fiscal pressure, the AOEs could be transferred to the Military Sealift Command's Naval Fleet Auxiliary Force (NFAF), whose civilian-crewed ships operate at a lower cost than Navy ships. Transferring the AOEs to the NFAF could save an estimated $140 million per year.

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LIST OF ACRONYMS

ADC(X)	Distribution Center Ship (Acquisition Concept)
AE	Ammunition Ship
AFS	Refrigerated Stores Ship
AN/SLQ-32	Shipboard Electronic Jamming System
AO	Oiler
AOE	Fast Combat Support Ship
AOR	Replenishment Oiler
ARG	Amphibious Ready Group
CIVMAR	Civil Service Mariner
CIWS	Close-In Weapons System
CLF	Combat Logistics Force
CNA	Center for Naval Analyses
CNO	Chief of Naval Operations
COMLOGGRU	Commander, Combat Logistics Group
CONREP	Connected Replenishment
CSRS	Civil Service Retirement System
CVBG	Aircraft Carrier Battle Group
CVN	Nuclear Powered Aircraft Carrier
DoN	Department of the Navy
FECA	Federal Employees Compensation Act
FERS	Federal Employees Retirement System
MILDET	Military Detachment
MPA	Manpower Authority
MSC	Military Sealift Command
NATO	North Atlantic Treaty Organization
NAVEDTRA	Naval Education and Training Center
NAVSURFWARCEN	Naval Surface Warfare Development Center

NFAF	Naval Fleet Auxiliary Force
OPCON	Operational Control
OPTEMPO	Operational Tempo
PCS	Permanent Change of Station
TACON	Tactical Control
UNREP	Underway Replenishment
USN	United States Navy
USNS	United States Naval Ship
USS	United States Ship
VERTREP	Vertical Replenishment

I. INTRODUCTION

A. PREFACE

The Aircraft Carrier Battle Group (CVBG) is the centerpiece of the United States Navy's ability to perform its vital missions of sea control, power projection and global presence. In this uncertain post-Cold War world, international diplomacy has become more complex and uncertain. Battle groups, by their overseas presence alone, are very effective tools of diplomacy. Today, several regional instabilities have the potential to threaten the interests of the U.S. Showing the flag, flexing U.S. muscle and controlling the seas are, as they have been throughout history, proven means to prevent conflicts from occurring. No service can match the Navy in global presence because the CVBG is the most mobile and flexible war fighting entity in the U.S. arsenal. In addition, the number and size of the battle group's assets make it more conspicuous and credible while overseas than any air wing or ground division. Therefore, to ensure that U.S. interests are protected in today's ever-changing geopolitical arena, fully capable battle groups must be deployed throughout the world.

The enabling factor that allows battle groups to perform its vital missions is superior at-sea logistics. If at-sea logistics is constrained or inefficient, the sustainability, and consequently the combat readiness of the battle group, is severely curtailed. Battle group ships and aircraft are dependent on the frequent replenishment of marine and aviation fuel, spare parts, munitions, food, and other logistical needs in order to maintain maximum readiness at sea.

Among the world's maritime powers, the U.S. Navy has always been the leader in at-sea logistics. This has been due in great part to the existence of state-of-the-art logistics ships that provide the many products that are essential for battle group assets to maintain the highest level of readiness. There are two general types of logistics ships in the U.S. Navy. One is the shuttle ship, which provides a single product such as fuel, ammunition or refrigerated stores. The other type is the station ship, which is a multi-product, "one stop shopping" asset. The Navy's only type of station ship is the Fast Combat Support Ship (AOE). In the current inventory there are eight of these ships. Four are of the *Sacramento* (AOE-1) Class, commissioned between 1964 and 1970. The other four are of the *Supply* (AOE-6) Class. Three of these have been commissioned so far in this decade and one is scheduled for commissioning in 1998.

Both classes carry the three basic commodities of fuel, ammunition and fleet stores required by the battle group, and they can deliver these products simultaneously. The ships can steam in excess of twenty-five knots and they are outfitted with defensive weapons systems. Both these characteristics allow the AOE to steam in company with a battle group at all times in a combat environment.

The important role of the AOE cannot be overemphasized, as battle groups operate in all parts of the world throughout the year with great logistical demands. Usually, aircraft carriers require aviation fuel at least weekly, if not twice per week. Also, the conventional aircraft carriers, cruisers, destroyers and frigates of the battle group typically require refueling at the same frequency. Add to this the requirements for food, ammunition, spare parts, water, dry cargo and mail, and it is easy to understand just how

vital the AOE is to the battle group, and to operational and combat readiness as a whole. In typical seagoing operations, the AOE is conducting some type of logistics evolution on an almost daily basis.

Along with the five *Cimarron* Class Oilers (AO), the AOEs comprise the last of the logistics ships in the Navy. A former Navy station ship, the Wichita Class Replenishment Oiler (AOR), has been decommissioned with no plan for transfer. Among the ships that were previously under Navy control, two classes of shuttles, the *Mars* Class Refrigerated Stores Ships (AFS) and the *Kilauea* Class Ammunition Ships (AE) have been transferred to the Naval Fleet Auxiliary Force (NFAF) of the Military Sealift Command (MSC). Like Navy logistics ships, NFAF ships fulfill the role of providing logistical support to the ships and aircraft of the Navy. However, unlike their Navy counterparts, NFAF ships are unarmed and operated by civilians. Collectively, both Navy logistics ships and NFAF ships comprise the Combat Logistics Force (CLF), which is the classification for all of the ships that provide logistical support to CVBGs, Amphibious Ready Groups (ARGs), warships operating independently or in small groups, and allied maritime forces when required.

In view of the critical importance of logistical support to the battle group, along with the reality of ever-shrinking defense budgets, the Navy began the trend of transferring its logistics ships to the NFAF early in this decade. The impetus for this trend rests primarily in the end of the Cold War. During the latter part of the Cold War, the United States endeavored to build a 600-ship Navy to counter the maritime threat posed by the former Soviet Union and Warsaw Pact. It was a widely-held belief at the time that a fleet

of such great size was required for the U.S. to maintain sea control, project power worldwide, and ultimately, to win a war at sea.

However, with the fall of the U.S.S.R. and the dissolution of the Warsaw Pact in the early 1990's, a 600-ship Navy was no longer considered a requirement by the U.S. leaders. Today's Navy has 346 ships, including aircraft carriers, combatants, amphibious ships and logistics ships. Partly in response to the end of the Cold War, Congress passed the Budget Enforcement Act of 1990. This act contained a built-in "peace dividend" which created caps on defense spending as a means to control the deficit. The dividend found its justification in the absence of a Soviet threat, and as a consequence, the measure began a trend of trading defense dollars for domestic appropriations. As a result, military officials were compelled to adopt a mind set of "do more with less." For the Navy, this meant that force planners would have to find ways to cut spending wherever possible, while at the same time preserving the Navy's operational and combat readiness worldwide. One difficult challenge created by this budgetary constriction was to maintain a viable fighting fleet, while managing significant reductions in Navy manpower. This problem still exists today.

As a potential remedy to the problem, the Navy began a trend in the early 1990's of transferring some of its logistics ships to the NFAF. The two primary reasons for this decision were first, that the ships would incur a lower operational cost due to the smaller Civil Service Mariner (CIVMAR) crews assigned to NFAF ships. Second, to help remedy the Navy's personnel shortfalls, the uniformed Navy personnel from logistics ships would

be made available for assignment to the aircraft carriers, as well as combatant and amphibious ships of the fleet.

In 1990, the Deputy Chief of Naval Operations for Logistics asked the Center for Naval Analyses (CNA) to assess the potential cost savings from transferring Navy logistics ships to the NFAF. A NFAF-operated ship would be manned by CIVMARs and a small Navy Military Detachment (MILDET). The CNA study focused on the operational costs of civilian versus Navy manning. It did not, however, address such less-quantifiable aspects such as CIVMAR crew endurance during periods of a high operational tempo (OPTEMPO) or during combat operations.

The study was compelling enough for the Chief of Naval Operations to approve the transfer of the *Mars* Class AFSs in October of 1990. Six AFSs were transferred between 1992 and 1995 for a net total cost savings of $63 million in 1993 dollars, or $10.5 million per ship per year. The savings were realized primarily due to a reduction in crew size from 404 Navy officers and enlisted to 135 CIVMARs and a 49-person MILDET. (Levine and Horowitz, 1993)

The reason for these savings was cited in the 1990 CNA report, which assessed that the MSC (NFAF) can operate Navy logistics ships with a smaller crew because skilled mariners are hired. Contrarily, Navy manning is so high because unskilled recruits must be constantly trained to replace skilled sailors who attrite or turn over in a few years (Rost, Keenan & Nelson, 1990). Another reason for larger Navy crews is the requirement to man special details like piloting, navigation and underway replenishment details, along with increased readiness conditions like Condition I (General Quarters), Condition III

(wartime steaming), and Condition IV (in port watches and duty). These requirements are driven not only by redundancy, but they are also rooted in the naval traditions of accountability and responsibility. There are no such requirements for a civilian crew.

All told, the transfer of the AFSs has yielded a significant cost savings for all six ships, as well as on a per ship per year basis. In addition, three former Navy *Kilauea* Class Ammunition Ships (AE) have been transferred to the NFAF, with five more pending transfer through 1998. Based on the 1990 CNA report, these ships are expected to yield an estimated net total financial savings of $52 million, or about $7.43 million per ship per year (Rost et al., 1990).

In view of the above, it is clear that the transfer of Navy logistics ships to the NFAF has helped the Navy to alleviate part of its financial and manpower burden. Even greater potential savings can be realized if the Navy were to transfer the AOEs. This would allow the AOEs to continue in their vital logistics role, while saving operations dollars and freeing-up scarce manpower.

B. THESIS PREVIEW

The objective of this thesis is to assess the advantages and disadvantages of transferring the AOEs to the NFAF. The overall purpose is to conclude whether or not the transfer is viable and worthwhile. Along with cost and manpower savings, other less-quantifiable issues are addressed. Among these is the performance of CIVMARs in wartime, CIVMAR OPTEMPO considerations, labor union-related issues regarding CIVMARs, and CIVMAR career and turnover issues. Also, the issue regarding the

disposition of the AOEs defensive weapons systems is examined, as well as concerns about the effects on readiness created by removing the AOEs from the Navy's inventory.

Chapter II discusses the mission and history of the NFAF and Navy logistics ships, along with a discussion of the general characteristics of both classes of AOE and the ships' mission. Chapter III examines the financial and manpower savings realized by the AFS transfers. Included in this chapter is an analysis of the costs incurred to convert the AFS to civilian standards. Chapter IV assesses the potential cost and manpower savings that could be realized by transferring the AOEs. Chapter V examines the many administrative and readiness issues regarding transfer, specifically with regard to CIVMARs in wartime and during high tempo operations. In addition, Chapter V addresses the disposition of the ships' weapons suites and the potential operational shortfalls the Navy might experience by losing them. Chapter VI concludes the thesis, and provides recommendations for DoN action.

II. THE MAJOR PLAYERS IN BATTLE GROUP LOGISTICS

A. THE NAVAL FLEET AUXILIARY FORCE (NFAF)

1. Background

The Naval Fleet Auxiliary Force (NFAF) is a component of the Military Sealift Command (MSC). Its mission is to provide direct logistical support to Navy ships at sea, as well as to perform special missions like towing and tug operations, resupplying ballistic missiles to submarines, undersea cable laying and oceanographic research.

The NFAF currently has thirty shuttles which it uses for replenishment of the Navy fleet. There are no station ships in its inventory. Eighteen of its ships are oilers of the *Henry J. Kaiser* Class (T-AO-187). There are nine refrigerated stores ships. Six of them are the former Navy *Mars* (T-AFS-1) Class, and three of the *Sirius* Class (T-AFS-8). The *Sirius* Class ships were purchased in 1982, from the United Kingdom's Royal Fleet Auxiliary, the British equivalent of the MSC. The NFAF also has three former Navy *Kilauea* Class (T-AE-26) ammunition ships, with five more scheduled for its inventory by 1998.

NFAF ships operate independently in all regions of the world, remaining on station where battle groups and Amphibious Ready Groups (ARGs) operate. As such, they maintain close proximity to naval forces so that when called upon, they can provide whatever logistical support is required. During replenishment operations with CVBGs, NFAF ships come under the tactical control (TACON) of the Battle Group Commander.

Also, they can be tactically or operationally controlled (OPCON) by a regional or on-scene commander, as the situation may dictate.

2. History of the Naval Fleet Auxiliary Force

The NFAF began on 4 May 1972. It was conceived for three primary reasons: first, because the use of CIVMARs would allow the assignment of Navy personnel, with their technical and war fighting skills to high technology warships; second, because the smaller CIVMAR crews would reduce operating costs and each CIVMAR could remain at sea indefinitely, as opposed to Navy personnel, who rotate to other assignments after a few years; and third, because money could be saved since civilian-manned ships spend less time in port, increasing their OPTEMPO (NAVEDTRA, 1985).

This tripartite theory was put to the test in 1972, when the former Navy USS *Taluga* was transferred to the MSC. Under MSC control, the USNS *Taluga* operated with one hundred and five CIVMARs and a sixteen-man Navy MILDET. The ship's record of performance was outstanding. It conducted more than one thousand underway replenishments (UNREPs) in its first six and a half years, and one thousand more in the following thirty-one months. In 1974, it was ranked first in productivity among Seventh Fleet oilers and it won the Navy's Outstanding Transportation Unit Award. USNS *Taluga's* operating costs were half of a Navy oiler's, saving the Navy more than three million dollars annually, while logging more than 60 percent of her time at sea (NAVEDTRA, 1985). Her accomplishments were noteworthy, and she proved that the plan was viable. The Commander of Seventh Fleet at the time, Vice Admiral James

Holloway, was very impressed with USNS *Taluga's* performance, proclaiming her OPTEMPO as, "Higher than most Logistics Force ships" (Breen, 1992).

The success of USNS *Taluga* inspired the MSC to study the transfer of logistics ships on a Navy-wide scale. A 1977 study examined the operational cost differences between Navy and CIVMAR manning for all Navy logistics ships. Concluded in 1978, the study reported a potential $270 million annual savings in personnel costs could be realized with a fleet-wide transfer.

The MSC augmented the NFAF with the purchase of three stores ships from the British RFA in 1982. Later that decade, contracts were awarded for eighteen oilers of the *Henry J. Kaiser* Class. The NFAF saw a second growth boom in the early 1990s, when the Navy, hard-pressed by post-Cold War budget reductions, authorized the transfer of six *Mars* Class AFSs and seven *Kilauea* Class AEs to the NFAF.

Except for inflation, nothing has changed regarding the cost savings that can be realized by manning Navy logistics ships with civilians. The NFAF is a professional, capable, and cost-effective organization for conducting the Navy's at-sea logistics operations.

B. NAVY LOGISTICS SHIPS

1. Background

Navy logistics ships, also called auxiliaries, provide CVBGs and ARGs with on-station logistics ships to meet all of the groups' needs. Currently, they are a twelve-ship entity, having been reduced by thirty-nine ships during this decade. This reduction is due in great part to previous and current NFAF transfers, and to a smaller extent, ship

decommissionings. Today's Navy has five shuttles, all *Cimarron* Class oilers. In addition, it has seven station ships--four *Sacramento* Class and three *Supply* Class AOEs.

These ships are manned by active duty Navy officers and enlisted personnel. They are under the direct administrative control of a Combat Logistics Group Commander (COMLOGGRU). During independent steaming operations, they fall under the TACON and OPCON of the Numbered Fleet Commander. When deployed, they are commanded by the Battle Group Commander along with the other ships of the group. They are outfitted with defensive weapons to counter potential air, surface and subsurface threats. Despite the lack of offensive firepower, they are still recognized as ships of war because they are armed nonetheless.

2. History of Navy Logistics Ships

The use of Navy logistics ships began during the Spanish-American War. Warships of that era burned coal. In the 1890s, a few coal delivery ships, or colliers, were built to sail with the fleet. However, colliers could not re-coal other ships while underway, so they required that warships enter port for re-coaling. This requirement was detrimental to readiness, as exemplified in the Cuban Blockade of 1898, where ships had to leave their blockade positions to re-coal in the Marine-guarded Guantanamo Bay (NAVSURFWARCEN, 1992). In 1904, a towable collier was designed that could connect its bow to the stern of battleships and transfer coal.

Just prior to the First World War, Navy ships were converted and built to burn fuel oil. Like their coal-delivering predecessors, the first oilers were designed to connect to

the stern of the receiving ship and be towed during the refueling process. It never worked, leaving the Navy again to resort to refueling in port.

This led to the construction of the USS *Maumee* (AO-2). It was the Navy's second oiler and its first diesel-powered ship. The ship's Chief Engineer, Lieutenant Chester Nimitz, designed a crude system using wire rope and pulleys, called a jury rig, to allow alongside refueling of underway ships. Making five knots of speed, destroyers could refuel with the USS *Maumee* only 40 feet away. She refueled thirty-four destroyers in three months. However, due to the crude nature of the refueling system, replenishments were limited to periods of light seas and daylight (NAVSURFWARCEN, 1992).

Between the World Wars, the USS *Maumee* method was the sole means of conducting at-sea replenishments. In 1939, Rear Admiral Nimitz, then a Task Force Commander, was directed by the CNO to develop a system and procedure for the underway replenishment of aircraft carriers. Since the USS *Maumee* was unable to refuel carriers, the Navy converted merchant ships to "jeep" aircraft carriers, where aircraft could receive commodities from oilers, ammunition ships and chartered merchant ships. This allowed aircraft to fly to the jeeps for fuel and ammunition replenishment, and return to the aircraft carrier.

During the Second World War, the Navy introduced the USS *Cimarron* Class Oilers. They were the largest and fastest ships of their kind with a maximum speed of 18 knots. However, they were still restricted by the fact that they used a modified version of the *Maumee* replenishment system. One ship of the class, the USS *Neches*, supported the Saratoga Battle Group during operations in the Pacific Theater. The USS *Neches*

underway replenishment (UNREP) speed was limited to 12.5 knots, and replenishment evolutions were frequently thwarted by the parting of lines in even moderate sea conditions, along with an inability of the system to adjust for changes in separation, and pitch and roll of the oiler and receiving ship.

Between the Second World War and the Korean War, Commodore Arleigh Burke also stressed the need for improved UNREP. Research and Development funding for the program was virtually nonexistent, and most of the World War Two replenishment ships were mothballed. As a consequence, Navy ships operating in the Sea of Japan off the Korean coast had to use the same crude replenishment method as their World War Two predecessors. It was Burke's concern that UNREP was a time-consuming process and that UNREP time was lost combat time. He called for a system that was quick and safe that could be used during day or night and in fair or foul weather (NAVSURFWARCEN, 1992).

At the Navy's San Francisco Conference of 1952, the CNO initiated a shipbuilding program to build ships specifically designed for UNREP. Despite the challenge of a historically-minimal UNREP Research and Development Program, six new oilers were built, along with two new refrigerated stores ships and two new ammunition ships in the mid-1950s. As part of this project, the Navy solved the wire-parting problem by developing a weight-tensioning system that was implemented in all of the new ships. The hydraulic system could automatically compensate for changes in ship separation, and pitch and roll, enabling two ships to UNREP at 80 foot separation in moderately heavy sea

conditions. This development put the U.S. Navy atop all other maritime powers in the realm of UNREP.

In the 1970s, the Department of Defense endured budget cuts as a result of national contempt for the war in Vietnam. The CNO, Admiral Elmo Zumwalt, felt the pressure of reduced budgets. One of his critical concerns was to replace five old oilers that were in disrepair. To do so, however, he would be forced to sacrifice the funding for five new combatants. He saw as the answer, copying the Soviet Navy method of using merchant ships to conduct UNREP. A strong proponent of merchant ship UNREP, Zumwalt was able to gain the support of the Maritime Unions for his plan. Most other Navy officials were against the plan, fearing a return to the primitive UNREP days of World War Two and Korea. However, under Zumwalt the USNS *Taluga* began operations in the Seventh Fleet in 1972.

However, the Soviets abandoned their merchant conversion program and began building UNREP ships only a year later. The U.S. Navy responded in kind, and by 1980 it had the world's largest and most technologically-advanced logistics fleet, consisting of forty shuttles and eleven station ships.

C. THE FAST COMBAT SUPPORT SHIPS (AOEs)

1. The Sacramento Class Fast Combat Support Ships (AOE-1)

The *Sacramento* Class ships, USS *Sacramento* (AOE-1), USS *Camden* (AOE-2), USS *Seattle* (AOE-3), and USS *Detroit* (AOE-4), were commissioned in the 1960s to provide a one-stop-shopping asset for battle group ships and aircraft. At 793 feet long, 107 feet wide, and 39 feet below the waterline, these ships are the largest and most

powerful logistics ships ever built for any Navy. Their 177,000 barrel fuel capacity is greater than the largest oiler, and their 2200 ton ammunition capacity equals any class of ammunition ship (AE). In addition, they have 500 tons of dry stores capacity and 250 tons of refrigerated stores carrying capacity.

In terms of its UNREP ability, a *Sacramento* Class ship has four fueling stations and three solid cargo stations. In addition, it can hangar three, and operate two CH-46E logistics helicopters for vertical replenishment (VERTREP) of one or more ships, while simultaneously conducting connected replenishment (CONREP) of solid or liquid cargo with a ship on each side.

Using a battleship-style, 100,000 horsepower steam propulsion plant, the AOE-1 can transit in excess of 26 knots, allowing it to achieve battle group speeds. In addition, it is outfitted with defensive weapons so that it can remain in company with a battle group without requiring additional combatant escorts for its defense. As a result of systems technology upgrades in the 1980s and 1990s, its weapons include an octuple launcher NATO Sea Sparrow Self-Defense Missile System, two Vulcan Phalanx Close-In Weapons Systems (CIWS), four 12.7 millimeter machine guns, the AN/SLQ-32 electronic interception and jamming system, and noise producing torpedo countermeasures. It also has a tactical target acquisition, air search, surface search and navigation radar capability.

As a single shopping platform, the AOE-1 represents a major cost reduction in contrast to building and operating an oiler, an ammunition ship and a stores ship. Also, because of its deep draft, the AOE-1 is stable in even the most oppressive sea states. This class of ship boasts a proven record of achievement, having supported battle group

operations in all theaters of operations and during all conflicts from Vietnam to Operation Desert Storm.

2. The Supply Class Fast Combat Support Ships (AOE-6)

In 1981, as part of the vision to create a 600-ship Navy, it was concluded that 15 aircraft carriers would need to be in service by 1990. The 15 carrier number was conceived as the means to gain an advantage over the Soviet Navy to achieve the vital objectives of sea control, power projection and global presence as outlined in the U.S. Maritime Strategy.

At the time, the Navy had 11 station ships. Seven were AORs and four were AOEs. In order to support 15 CVBGs, four more station ships were required. As a result, the AOE-6 Program commenced in the mid-1980s. Three of the ships, the USS *Supply* (AOE-6), USS *Ranier* (AOE-7), USS *Arctic* (AOE-8) are currently in service. The last of the class, USS *Bridge* (AOE-10) is slated for commissioning in 1998. There is no AOE-9 because the money appropriated for it was re-baselined to pay contractor claims for the AOE-6. In addition, a fifth *Supply* Class ship will be requested sometime in the next decade to meet long term fleet requirements (Truver, 1996, p. 60).

The *Supply* Class AOE is smaller than its predecessor by one cargo hold and UNREP station. Specifically, it is 754 feet long, 107 feet wide, and 38 feet below the waterline. A major difference is the propulsion plant. The AOE-6 uses gas turbine propulsion to more economically and efficiently achieve 26 knots of speed with far less operational complexity than a steam propulsion plant. It also uses a state-of the-art Reversing Reduction Gear, which like the controllable pitch propellers on combatants

enhances maneuverability and reduces the ship's noise, making it less susceptible to detection by submarines.

Like the AOE-1, the AOE-6 carries marine and aviation fuel, ammunition, dry and refrigerated stores, spare parts and water. However, because it is slightly smaller, the AOE-6 carries less of these commodities than its sister class. Its cargo capacities are 156,000 barrels of fuel, 1800 tons of ammunition, 400 tons of refrigerated stores, and 250 tons of dry stores.

The AOE-6 also has a similar, but more technologically up-to-date defensive weapons suite than the AOE-1, including upgraded versions of the NATO Sea Sparrow missile system and twin Close-In Weapons System (CIWS) mounts, and the addition of two 25 millimeter chain guns. Otherwise, it has the same electronic intercept and jamming system, machine guns, torpedo countermeasures and radars as its predecessor. Also, like the AOE-1, the AOE-6 can hangar three and operate two CH-46E logistics helicopters for VERTREP and it can CONREP two ships at the same time.

The ships of this class have a short history. Only the *Supply* has deployed to date, as part of the USS *Enterprise* (CVN-65) Battle Group. However, this class of ship will support the fleet well into the next century.

III. THE COST SAVINGS FROM OPERATING AFSs IN THE NFAF

A. BACKGROUND

In 1990, several years after the USNS *Taluga* set her impressive records, the Navy revisited the issue of manning its logistics ships with civilians. Like the days of Admiral Zumwalt, the 1990s Navy was faced with substantial budget cuts, caused this time by the end of the Cold War. In an effort to alleviate a part of this new financial pressure, the Chief of Naval Operations asked the Center for Naval Analyses (CNA) to examine the issue of manning logistics ships with CIVMARs for operation in the NFAF.

The CNA report was published in 1990 and it concluded that in the case of the *Mars, Kilauea,* and *Cimarron* Class logistics ships, a transfer to the NFAF would yield a substantial savings in operational costs due to the use of civilian crews. The AOE was not included in the assessment.

Specifically, the report concluded that a net financial savings of $55.2 million per year could be realized if the six *Mars* Class ships were NFAF operated. Such a savings would result because of a 46 percent reduction in manning as a result of using CIVMARs instead of Navy personnel. Operating the seven *Kilauea* Class ships in the NFAF would reduce the ships' Navy crew requirement by 48 percent and save an estimated $49 million per year. In the case of the *Cimarron* Class ships, a 55 percent reduction in manning would yield an annual cost savings of $22 million per year. (Rost, et al., 1990)

Today, the *Cimarron* Class are still in the Navy inventory, while Navy-to-NFAF transfers of the *Kilauea* Class are currently in progress. In the case of the *Mars* Class

ships however, the transfers are complete, with three of the ships having become active in the NFAF in Fiscal Year 1993 and the other three in Fiscal Year 1994. The actual net cost savings per annum for the six ships of this class are $63 million in 1993 dollars. This figure reflects the difference when the costs of converting the ships to CIVMAR standards are subtracted from the savings achieved by replacing Navy crews with CIVMAR crews and a small Navy MILDET.

B. CONVERSION COSTS

The costs of converting the AFS ships are broken down into three categories: modification costs; opportunity costs for lost operational time due to conversion; and anticipated post-conversion life-cycle costs.

1. Modification Costs

Costs were incurred to modify each AFS to CIVMAR standards. Specifically, there were two levels of modification, a full modification and an interim modification.

a. Full Modification

A full modification included installation of three 12,000 pound pallet capacity elevators per ship to improve vertical lift capability and the speed, efficiency and reliability of the cargo handling system as a whole. In addition, due to the demand for less spartan living conditions by CIVMARs, habitability upgrades included the removal of the ships' 30 to 80-person enlisted berthing compartments and replacing them with one-to-six person staterooms. In addition, costs were incurred to make the ships' propulsion stations more automated so that they could be operated by CIVMAR engineering watch teams, which have less personnel than Navy teams. In addition, existing cargo handling systems,

including elevators, cranes and winches, received myriad minor automation upgrades. Ten months were required to complete a full modification and the cost was $44 million in 1993 dollars. (Mausar, 1993)

b. Interim Modification

An interim modification was the same as the full modification in all regards with the exception of the installation of the 12,000 pound pallet capacity elevators. Two of the ships received an interim modification, while one ship received both a full and an interim modification (Mausar, 1993). Table 1 shows a breakdown of modification costs.

Modification Type	Number of Ships	Cost Per Modification	Subtotal Cost
Full	3	$ 44 Million	$ 132 Million
Interim	2	$ 11 Million	$ 22 Million
Both	1	$ 55 Million	$ 55 Million
Total Cost			$ 209 Million

Table 1. AFS Modification Costs

2. Opportunity Costs of Conversion

The costs of keeping a vessel out of operation during a conversion are difficult to quantify. However, the assumption herein is that another ship would perform the operations of an AFS undergoing conversion for $8.1 million, which is the estimated annual operational maintenance cost for an AFS, whether CIVMAR or Navy manned. (Mausar, 1993) Two ships received the ten-month full modification, three ships received

the five-month interim modification, and one ship received both modifications. The resultant total lost operational time was fifty-five months, which equates to a total cost incurred was $37.2 million. Table 2 shows a breakdown of the opportunity costs incurred by AFS conversion.

Modification Type	Number of Ships	Duration of Modification	Annual Opportunity Cost	Subtotal
Full	3	10 Months	$ 8.1 Million	$ 20.3 Million
Interim	2	5 Months	$ 8.1 Million	$ 6.8 Million
Both	1	15 Months	$ 8.1 Million	$ 10.1 Million
Total Cost				$ 37.2 Million

Table 2. Opportunity Costs from Lost Operating Time During AFS Conversion

3. Post-Conversion Life-Cycle Costs

In 1993, a financial assessment conducted by the AFS Conversion Program Office at MSC determined that as of 1994, the three oldest AFSs would have a five-year useful life, while the three oldest ships would have a ten-year useful life (Mausar, 1993).

C. COST SAVINGS FROM CIVILIAN MANNING OF THE AFSs

According to MSC calculations, manning costs for NFAF ships are a function of total wages for the ship's crew. Specifically, the cost per CIVMAR consists of base pay, fringe benefits, overtime, substinence, and pipeline (unproductive time) (Levine and Horowitz, 1993). MILDET costs are calculated by applying Navy billet costs to the specific Navy pay grade levels assigned to the AFS.

For a Navy AFS, a crew of 404 personnel (27 officers and 377 enlisted) is required to achieve full mission readiness. However, to operate an AFS in the NFAF, only 135 CIVMARs are required, along with a 49-person MILDET. As a result, the Navy gains because 22 officers and 333 enlisted personnel are made available for fleet assignment as a result of each ship's transfer. This allows the Navy to save money since 355 members need not be recruited and trained to fill seagoing billets in the Navy fleet. Table 3 shows the difference in billets between a NFAF and Navy-operated AFS.

Agency	Navy Officers	Navy Enlisted	Total Navy	CIVMARs	Total
USN	27	377	404	0	404
NFAF	5	44	49	135	184

Table 3. Differences in Seagoing Billets for a Navy and NFAF-Operated AFS

The savings from eliminating a Navy crew are $19.3 million per ship, per year, while the cost of the CIVMAR crew and MILDET is $8.8 million per year (Levine and Horowitz, 1993). This yields a net savings of $10.5 million per ship per year, or $63 million in total dollars saved for the ship class per year. Ignoring inflation, the three older ships will have saved $157.5 million over their remaining five-year useful life, while the three newer ships will save $315 million over their remaining ten-year life-cycle. Table 4 shows a breakdown of the cost difference between a NFAF and Navy crewed AFS.

Agency	Navy Officers	Navy Enlisted	Total Navy	CIVMARs	Total
USN	$ 2.4 M	$ 16.9 M	$ 19.3 M	$ 0.0 M	$ 19.3 M
NFAF	$ 0.5 M	$ 2.2 M	$ 2.7 M	$ 6.1 M	$ 8.8 M

Table 4. Annual Personnel Billet Costs Per Billet Type for One AFS

However, to assess the net savings of AFS transfer, the conversion costs must be applied. As previously stated, these costs are a function of modifications, lost operating time, and life-cycle. For the three older ships, the estimated cost for five years of operation is $ 93.9 million, which when subtracted from the $ 157.5 million savings due to civilian manning for these ships, results in a five-year net savings of $63.6 million, or $4.2 million per ship, per year. Tables 5 through 7 show a breakdown of these costs. Subtracting the sum of the total costs listed in Tables 6 and 7 from the total cost savings listed in Table 5 yields the $ 63.6 million figure.

Remaining Years of Service	Number of Ships	Manpower Cost Savings Per Ship	Total Savings
5	3	$10.5 Million	$ 157.5 Million

Table 5. Savings From Civilian Manning of AFSs With FiveYears of Service Remaining

Modification Type	Number of Ships	Cost Per Modification	Subtotal Cost
Full	0	$ 44 Million	$ 0 Million
Interim	2	$ 11 Million	$ 22 Million
Both	1	$ 55 Million	$ 55 Million
Total Cost			$ 77 Million

Table 6. Modification Costs for AFSs With Five Years of Service Remaining

Modification Type	Number of Ships	Duration of Modification	Annual Opportunity Cost	Subtotal Cost
Full	0	10 Months	$ 8.1 Million	$ 0.0 Million
Interim	2	5 Months	$ 8.1 Million	$ 6.8 Million
Both	1	15 Months	$ 8.1 Million	$ 10.1 Million
Total Cost				$ 16.9 Million

Table 7. Opportunity Costs for AFSs With Five Years of Service Remaining

In the case of the three newer ships, a net savings of $162.7 million, or $5.4 million per ship per year is realized. Tables 8 through 10 show a breakdown of these costs, with the calculations therein being the same as Tables 5 through 7.

Remaining Years of Service	Number of Ships	Manpower Cost Savings Per Ship	Total Savings
10	3	$10.5 Million	$ 315 Million

Table 8. Savings From Civilian Manning of AFSs With Ten Years of Service Remaining

Modification Type	Number of Ships	Cost Per Modification	Subtotal Cost
Full	3	$ 44 Million	$ 132 Million
Interim	0	$ 11 Million	$ 0 Million
Both	0	$ 55 Million	$ 0 Million
Total Cost			$ 132 Million

Table 9. Modification Costs for AFSs With Ten Years of Service Remaining

Modification Type	Number of Ships	Duration of Modification	Annual Opportunity Cost	Subtotal Cost
Full	3	10 Months	$ 8.1 Million	$ 20.3 Million
Interim	0	5 Months	$ 8.1 Million	$ 0.0 Million
Both	0	15 Months	$ 8.1 Million	$ 0.0 Million
Total Cost				$ 20.3 Million

Table 10. Opportunity Costs for AFSs With Ten Years of Service Remaining

Annual maintenance costs throughout each ship's life-cycle will have no net effect on the annual cost savings, because in both the NFAF and Navy case, the costs are the same. Specifically, maintenance costs are estimated to be $6.7 million per year (Levine and Horowitz, 1993). This amount represents the sum of expected costs for both intermediate and depot level maintenance.

In addition, based on Navy-operated AFS cost data, it is assumed that in the future, a $1.1 million cost will be incurred for unit level maintenance, along with $0.3 million incurred for miscellaneous maintenance. The resulting total maintenance cost is $8.1 million per ship per year. (Mausar, 1993)

IV. THE COST SAVINGS FROM OPERATING AOEs IN THE NFAF

A. BACKGROUND

Since the AOEs have never been transferred to the NFAF, the costs incurred to convert the ships to CIVMAR standards, as well as the potential savings that would occur as a result of civilian manning must be estimated. Therefore, the costs for AFS conversions are used as the model for the assumptions made regarding AOE conversion costs, while the differences in crew sizes and costs rely on different data, namely assumptions made in previous similar studies.

As was the case for the AFSs, transferring the AOEs will involve physical modifications and lost operational time as a result of those modifications. In addition, the remaining service life of the ships must be assessed. The resultant costs must then be applied to the costs of CIVMAR manning for the AOEs, and a difference would indicate the potential net savings of the conversion program. All of the calculations and assessments in this chapter assume that USS *Bridge* (AOE-10) is active, making a fleet inventory of eight AOEs.

B. CONVERSION COSTS

The costs of converting an AOE are broken down into three categories: modification costs; opportunity costs for lost operational time due to conversion; and anticipated post-conversion life-cycle costs.

1. Modification Costs

In view of the fact that there is no NFAF equivalent for the AOE, it is difficult to determine what specific upgrades would be required in a conversion. However, it is assumed that the four *Sacramento* Class AOEs will require a modification similar to the ten-month full modification required by some of the AFSs. This assumption is based on the fact that since these ships are older, more time would be required for habitability upgrades and for automation of the large and complex steam propulsion plant.

In the case of the *Supply* Class AOEs, it is assumed that a shorter modification, like the five-month interim modification required by some of the AFSs will be required. This assumption is based on the fact that since these ships are newer, their habitability areas are in better material condition. Also, since gas turbine propulsion plants are far more automated than steam plants, and subsequently require less personnel to operate them, it is likely that propulsion system upgrades will take less time.

The cost for a full modification is assumed to be $ 48.4 million, which is the cost of an AFS full modification, adjusted (Council of Economic Advisors, 1996) for Fiscal Year 1997 dollars. Using the same criterion, the cost of the interim modification is $12.1 million. Table 11 shows a breakdown of these costs.

Modification Type	Number of Ships	Cost Per Modification	Subtotal Cost
Full (AOE-1)	4	$ 48.4 Million	$ 193.6 Million
Interim (AOE-6)	4	$ 12.1 Million	$ 48.4 Million
Total Cost			$ 242.0 Million

Table 11. AOE Modification Costs

2. Opportunity Costs of Conversion

Like in the AFS case, these costs are very difficult to quantify. However, the assumption is that another ship would have to incur the operating costs that an AOE would incur in performing its operational commitments. The cost of this lost opportunity is $15.3 million per ship per year in Fiscal Year 1997 dollars. This figure is based on the annual maintenance costs for a fleet operational AOE. It does not consider the other operational costs of fuel and ordnance because the cost of their consumption varies greatly, depending at time in port and at sea, as well as during periods of peace and crisis. Table 12 shows a breakdown of these costs. The resultant total cost of modification is $ 318.5 million for all of the ships, which equates to approximately $ 39.8 million per ship per year.

Modification Type	Number of Ships	Duration of Modification	Annual Opportunity Cost	Subtotal
Full	4	10 Months	$ 15.3 Million	$ 51.0 Million
Interim	4	5 Months	$ 15.3 Million	$ 25.5 Million
Total Cost				$ 76.5 Million

Table 12. Opportunity Costs from Lost Operational Time During AOE Conversion

3. Post-Conversion Life-Cycle Costs

Unlike the AFSs, the AOEs will have a remaining service life that is much greater than five or ten years. This is the case because whether they are Navy or NFAF-operated, there will only be eight of them at the turn of the century to support a 12-aircraft carrier Navy well into the future. The *Supply* Class AOEs are very new, and in the case of the *Sacramento* Class AOEs, it is common for ships which have been in commission for more than 40 years to remain in Navy or NFAF operation. Also, if a fifth *Supply* Class ship is built, it would not be in service until late in the next decade, leaving the U.S. inventory with three less station ships than aircraft carriers. Add to this, the fact that the next generation station ship, the ADC(X), is only in the initial design studies, and would not be procured until at least the year 2000 (Truver, 1996). Based on recent acquisition time lines for new construction ships, it is reasonable to conclude that after the ADC(X) is procured, it cannot be in commission until at least the end of the next decade. In view of these facts it is assumed that the end of the ships' service life is inconclusive. Thus, it is

assumed that all of the costs incurred and savings realized will occur on an annual basis until the ships are retired.

C. COST SAVINGS FROM CIVILIAN MANNING OF THE AOEs

As the result of CIVMAR crewing, the savings for the AOE are potentially greater than for the AFS because it is estimated (Levine and Horowitz, 1993) that the CIVMAR crew requirement for one AOE is only 18 percent greater than for an AFS, while the Navy crew that would be eliminated is 45 percent larger than an AFS Navy crew.

In terms of its Navy crew, the Manpower Authority (MPA) for one AOE as set forth by the Department of the Navy requires that the ship have 26 officers and 529 enlisted persons to conduct all of the missions required of the ship in all conditions of readiness, and in all operational theaters. The CIVMAR estimate for a NFAF operated AOE is 159, while it is assumed that a 40-person Navy MILDET (two officers and 38 enlisted persons) would also be required. Table 13. Shows the difference in crews for a Navy and NFAF-operated AOE.

Agency	Navy Officers	Navy Enlisted	Total Navy	CIVMARs	Total
USN	26	529	555	0	555
NFAF	2	38	40	159	199

Table 13. Differences in Seagoing Billets for a Navy and NFAF-Operated AOE

The billet cost for a CIVMAR is the sum of base pay, fringe benefits, overtime, substinence, and pipeline. This equates to an average billet cost of $ 57,400 adjusted for

Fiscal Year 1997 dollars. For Navy personnel, the billet costs are a sum of base pay and benefits, the amortized cost of completed training and future retirement, the amortized cost of veterans' benefits, and an allowance for unproductive time due to leave and holidays. This equates to an average billet cost of $ 99,000 for officers and $ 49,500 in FY 97 dollars for enlisted personnel. (Levine and Horowitz, 1993)

When these billet costs are multiplied by the personnel figures in Table 13 the resultant cost of a Navy crew on an AOE is $ 28.8 million annually, while the estimated cost to operate the ship in the NFAF is $ 11.3 million. The savings in crew costs yield $17.5 million per ship per year, which equates to an annual savings of $ 140 million per year. Table 14 shows a breakdown of the cost differences between a Navy and a CIVMAR-crewed AOE.

Agency	Navy Officers	Navy Enlisted	Total Navy	CIVMARs	Total
USN	$ 2.6 M	$ 26.2 M	$ 28.8 M	$ 0.0 M	$ 28.8 M
NFAF	$ 0.2 M	$ 1.9 M	$ 2.1 M	$ 9.1 M	$ 11.3 M
Net Savings					$ 17.5 M

Table 14. Annual Personnel Billet Costs Per Billet Type for One AOE

For all eight of the AOEs, $ 140 million can be saved each year as a result of manning the ships with CIVMARs and a small MILDET. However, the assessment of the savings is not complete without applying the $ 318.5 million conversion costs. The result is a net cost of $178.5 million after the ships' first year of post-conversion operations and

$ 38.5. million after the second year. After the third year following conversion, the CIVMAR-manned AOEs will realize a net savings of $ 101.5 million, with the conversion having been payed-off approximately three months into the year. In the fourth year, and the remaining years of the ships' service lives, the $ 140 million savings can be realized. These costs and savings are shown in Table 15.

Post-Conversion Year	Conversion Costs	Personnel Savings	(Cost)/Savings
1	$ 318.5 Million	$ 140 Million	($ 178.5 Million)
2	$ 178.5 Million	$ 140 Million	($ 38.5 Million)
3	$ 38.5 Million	$ 140 Million	$ 101.5 Million
4	$ 0 Million	$ 140 Million	$ 140 Million

Table 15. AOE Conversion Cost Pay-Off Term and Following Years Savings

V. OTHER FINANCIAL, ADMINISTRATIVE AND OPERATIONAL ISSUES

A. NAVY MEMBERS MADE AVAILABLE FOR REASSIGNMENT

As mentioned earlier, the Navy Fleet is slightly more than 360 ships strong - a figure that is almost half of the nation's 600-ship Cold War target. Recent defense cuts have not only reduced the Navy's capital assets, but its personnel base as well. In view of this fact, the transfer of the AOEs offers a second advantage: after subtracting MILDET billets, 24 officers and 491 enlisted persons would be made available from each ship for assignment to the aircraft carriers, cruisers, destroyers, frigates and amphibious ships of the fleet. In total, the transfer of all eight AOEs would make about 200 officers and 4000 enlisted personnel available.

In view of the fact that there are always some vacancies in critical officer billets and Navy Enlisted Classification Codes in the fleet, the availability of nearly 4200 personnel created by AOE transfers would provide the Navy with a means to fill these vacancies. In addition, the transfer would provide personnel to remedy any shortfalls in the Naval Reserve.

Those Navy personnel who remain in the fleet to fill these critical billets would receive Permanent Change of Station (PCS) orders for assignment to another ship. Those personnel not required to remain in the Navy would receive PCS orders for separation from active duty. In either case, a cost would be incurred for PCS transfers. These costs are a combination of the cost of moving personal effects, and travel and substinence for Navy personnel and their dependents.

The average cost of PCS orders takes into account all move types, which include transoceanic, domestic, and training-only moves. In Fiscal Year 1996, the average cost of PCS orders for a Navy officer was $ 7,634. Seventeen percent of all officer moves incurred no cost, because those officers were transferred to other Navy commands or chose to leave the Navy in the same geographic area as their transferring activity. Assuming that this same cost would apply to the officers released by transferring the eight AOEs, the resultant cost would be approximately $ 1.2 million. In the case of enlisted personnel, the Fiscal Year 1996 average cost for a PCS move was $ 4,619, with 28% of all enlisted moves incurring no cost. For the AOEs, the transfer of enlisted personnel would cost approximately $ 13 million, making the total cost of transfers for all personnel about $ 14.2 million. (Bureau of Naval Personnel, 1997) It is important to emphasize however, that even if the AOEs were not transferred to the NFAF, these same costs would be incurred for personal transfers and separations, albeit dispersed over a longer time period. Table 16 shows a breakdown of PCS costs.

USN Personnel Type	Available After 8-Ship Transfer	% Requiring Cost Orders	Total Personnel	Cost Per Person	Subtotal
Officer	192	83%	159	$ 7,634	$ 1.2 M
Enlisted	3928	72%	2828	$ 4,619	$ 13.0 M
Total					$ 14.2 M

Table 16. The Cost of PCS Orders for Navy Officers and Enlisted Personnel

B. DIFFERENCES IN NFAF AND NAVY OPTEMPO

Operational Tempo (OPTEMPO) measures the total amount of time in calendar days that a ship is conducting operations at sea. In the case of Navy ships, the Office of the Chief of Naval Operations has a long standing policy that U.S. Navy ships cannot be deployed away from their home ports for a period of greater than 180 days, except in the event of a national crisis. There is no such requirement for the CIVMAR-crewed ships of the NFAF, nor does the CNO requirement apply to their embarked MILDETs.

With a greater OPTEMPO, more operational and logistical commitments could be met using fewer NFAF ships and subsequently, less human capital than in the case of using only Navy logistics ships, or both NFAF and Navy ships. A specific example was during the crisis in the Arabian Gulf, where the highest OPTEMPO among NFAF ships was a record 278 days by the USNS *Andrew J. Higgins* (TAO-190), compared to an average 198-day OPTEMPO by Navy-manned ships (Mausar, 1993). The fact that NFAF ships are cheaper to operate than Navy-manned logistics ships, coupled with the fact that civilians have no policy restrictions on deployment periods, makes the idea of crewing an AOE with civilians an attractive one for the Department of the Navy. This would be the case not only in financial terms, but in operational considerations as well, since having a station ship in an operational theater for an indefinite period offers greater flexibility and reliability to CVBG and ARG assets, as battle groups would not need to be concerned with logistics ship vacancies or delays in theater.

However, a higher OPTEMPO is not without its inherent risks. During the gulf war, NFAF ships operated at an exhausting pace. Often, crews worked around the clock

for up to five days at a time, and spent nearly three months conducting same-day on-loads in port, with an immediate return to sea. The pace was exhausting and CIVMARs received very little shore leave, while leisure time was a rarity both in port and at sea. (Mausar, 1993) The NFAF Oilers of the *Henry J. Kaiser* Class logged high OPTEMPOs that were comprised almost exclusively of several multi-ship UNREPs per day. Considering such heavy demands on personnel, and the fatigue that results, it is reasonable to assume that NFAF CIVMARs would be at greater risk for an accident.

Surprisingly however, even during the most oppressive operating schedules, NFAF ships have an impressive safety record that it is significantly better and less costly than the Navy's. During the period, 1992 to 1996, MSC ships had significantly fewer reported accidents and lower accident-related costs than Navy ships, despite a higher OPTEMPO. Specifically, the incidence of all types of reported accidents (explosions, floods, collisions, groundings, etc.) on MSC ships was less than or equal to Navy ship incidence, and accident-related costs per MSC ship was an impressive 79 percent less on average than for a Navy ship (Naval Safety Center, 1997).

C. CIVMAR LABOR UNION ISSUES

Like all employees of the Federal Government, CIVMARs' labor-management relations are governed by Chapter 71 of Part 5 of the United States Code, which prohibits striking, and protects federal employees from having to join labor unions and paying union dues. In this regard, the federal government is an *open shop*, meaning that an employee need not join a union as a condition of being hired or continuing his or her employment (Morris, 1997). In contrast, private sector merchant mariners work for *closed shops*,

meaning that they are compelled to pay union dues as a condition of their employment. In addition, CIVMARs do not or cannot contribute to any union pension plans, because they are pensioned by either the Civil Service Retirement System (CSRS) or the Federal Employees Retirement System (FERS), depending upon the year they entered Federal service. Also, they cannot participate in any union vacation plan, but rather, they are participants in a government leave plan.

Nonetheless, federal requirements do not prohibit CIVMARs from participation in private sector labor unions. If they choose to be union members, they pay dues using their own resources. As such, no additional federal allocations are authorized or required to subsidize CIVMARs' union membership.

Several skill or trade-specific maritime labor unions represent CIVMARs. To do so, a union must be elected by a majority of CIVMARs to represent them in a particular bargaining unit, like a licensed deck officer or licensed engineer bargaining unit. If an elected union is duly certified by the Federal Labor Relations Authority, it is required by Chapter 71 of 5 U.S. Code to represent all CIVMARs, even those who do not pay dues. These bargaining units are the means by which CIVMARs are represented in labor disputes with the government. (Morris, 1997) This arrangement applies throughout the Federal Government, which views it positively, as stated in Chapter 71 of 5 U.S. Code:

> Congress finds that . . . experience in both private and public employment indicates that statutory protection of the right of employees to organize, bargain collectively, and participate through labor organizations of their own choosing in decisions which effect them:
>
> (a) safeguards the public interest
> (b) contributes to the effective conduct of public interest

(c) facilitates and encourages the amicable settlements of disputes between employees and their employers involving conditions of employment . . . .

CIVMARs are represented by several different professional unions, not only for representation in labor matters, but also as a means to receive specialty training, if required. CIVMARs are represented by three unions which hold national recognition. The International Organization of Masters, Mates and Pilots represents all CIVMAR licensed deck officers. The Marine Engineers' Beneficial Association, District Number One represents all CIVMAR licensed engineers. The Federal Association of Communicators and Technicians represents all CIVMAR Radio Officers. On the regional level, The Marine Staff Officers Union represents CIVMAR nurses and pursers in both the Atlantic and Pacific Fleets, while the Seafarers International Union represents unlicensed CIVMARs in MSC Pacific, and the National Maritime Union represents unlicensed CIVMARs in MSC Atlantic. (Kolpa, 1996)

With regard to union-related costs borne by the Federal Government, most costs are administrative and/or legal. Specifically, the costs stem from the requirement for arbitration when the government and labor cannot settle grievances (Kolpa, 1996). In such a case, the costs are usually shared by both parties, and tend to fluctuate significantly, depending on the situation. However, the need for arbitration is rare, and most of the union-driven costs incurred by MSC are administrative in nature and minimal in amount. These costs are paid from MSC's annual budget, thus requiring no additional or special appropriations (Morris, 1997).

D. CIVMARs IN WARTIME

To rely on patriotism to compel CIVMARs to participate in a wartime mission is risky. Unlike Navy personnel who must go to war when called, or face severe punishment if they choose not to, CIVMARs view their role as simply a job. They realize that their skills are easily transferrable to the merchant fleet. Obviously, this raises a legitimate concern. Take for example, a statement by Captain David Teel, a CIVMAR Master who commanded a MSC vessel during the Arabian Gulf crisis. In Houston, Texas, while the ship was being loaded for its second trip to the gulf, almost half of the crew deserted. Teel commented that, "While seamen as a whole are pretty patriotic in a crisis, I suspect if shooting breaks out a certain percentage will take a hike." (Donovan, 1992).

Fortunately, this case represents the sole incident of crew desertion during the gulf war, and desertion is not the norm for CIVMARs (Morris, 1997). Previous experience has found that CIVMARs showed no reluctance to go to war in Korea, Vietnam or Libya. The Department of the Navy realizes the crucial role of CIVMARs in times of conflict. After the gulf war, DoN authorized retroactive bonus pay to all CIVMARs involved as a means to recognize their willingness to risk their lives for the nation, as well as to create an incentive for them to do so again if required (U.S. Dept. of Defense, 1991). Today, in the event that CIVMARs are involved in wartime operations, DoN regulations mandate that special pay can accrue to them. Finally, no special insurance is required for CIVMARs in war, because they are covered by the Federal Employees Compensation Act (FECA).

E. THE DISPOSITION OF THE AOEs' WEAPONS SUITES

A key objective in war is to identify and destroy the enemy's logistics system and capability. For this fact, a ship that provides logistical support to CVBGs and ARGs is a high value target, whether or not its crew is comprised mostly of noncombatants. However, ships in the NFAF, like all MSC ships have none of the high technology defensive weapons systems of their Navy counterparts. In the case of the AFSs, the crew is left with a dozen small arms (handguns and shotguns). These weapons are used by security teams to guard the ship while it is in port. At sea, these guns are useless, considering the current nature of high technology naval warfare. Centuries-past Ships of the Line were better armed against pirates.

Should the AOEs be transferred, this would mean that their defensive missile systems, CIWS, electronic jamming and decoy systems will be removed. In the event that a NFAF AOE is assigned to a CVBG under the Battle Group Commander's TACON, this would not be a problem, since the ship would easily come under the offensive umbrella of the group's warships. When this would become a problem however, is a situation that would require the CVBG to be dispersed, requiring the AOE to move longer distances between individual ships or small groups of ships to deliver its commodities. Obviously, this would put the AOE at risk of attack. Considering that the Battle Group Commander is solely responsible for all of the lives and capital under his charge, a defenseless ship steaming independently is an extremely unsettling prospect, not to mention a grossly imprudent and negligent one. In such a case then, the Battle Group Commander would be

compelled to incur an opportunity cost by having to commit one of his ships to escort the AOE, taking the escort from myriad possible other missions.

However, to keep the weapons suite on a NFAF-operated AOE would mean that the embarked MILDET would have to be significantly larger in size to include several enlisted specialists like Fire Controlmen, Electronic Warfare Specialists, Operations Specialists and Electronics Technicians. This would also require additional officers to manage these enlisted specialists. Such a sizable MILDET augmentation would result in a significant increase in personnel costs, thus defeating the cost saving purpose of AOE transfer.

F. THE EFFECT OF AOE TRANSFER ON CVBG READINESS

Navy officials are reluctant to cede the AOEs to the NFAF for three main reasons. First, the Navy is reluctant to relinquish control of any asset that serves the critical mission of logistics support. Second, with the recent, radical downsizing that the fleet has experienced in this decade, the Navy has become very protective of its inventory. This is especially true with regard to the AOEs because of their multi-mission capability, combined with the fact that the *Supply* Class ships are the newest and most state-of-the-art of their kind. Third, Battle Group Commanders traditionally have a very corporate mind set, in that they wish to control as many assets as possible, while jealously guarding them against release from their control. (French, 1996)

This is not meant to convey a bias against the Navy or Battle Group Commanders. Considering that the 1990s has been a decade of radical downsizing in comparison to the 1980s, it would seem that the Navy's leeriness about, and resistance to further reductions

in its inventory is justified. In addition, a Battle Group Commander is under constant pressure to maintain optimal combat readiness at all times. Thus, it is understandable that the loss of a capital asset would be unsettling. This is especially true with regard to the AOE, since combat readiness is extremely dependent on fast, responsive and flexible logistics.

However, by virtue of his authority, the Battle Group Commander can assume OPCON and TACON of any asset in his area of responsibility that is not already under the control by a more senior officer. This is the case with today's NFAF ships, which are assumed under the Battle Group Commander's control for all replenishment operations with the CVBG. Yet because of their other regional logistical commitments, NFAF ships do not train with the CVBG during pre-deployment exercises, nor do they usually steam with CVBGs in transit from the U.S. to foreign regions.

Finally, Navy officials view the AOEs as highly capable and valuable assets, since they can keep up with a CVBG and provide it with all of the commodities it needs, while being able to defend themselves. Therefore, it is easy to understand the Navy's reluctance to transfer these ships. Nonetheless however, today's post-Cold War environment demands that cost reductions must be pursued, even if there is the potential for reduced readiness in the form of fewer assets.

VI. CONCLUSION

A. BACKGROUND

As the only station ships in the U.S. inventory, the AOEs will continue to play a vital role in ensuring the maximum level of combat readiness for the CVBGs. By virtue of their capacity, speed and myriad capabilities, the AOEs are without question, the single most valuable logistics entities in the maritime world. However, like all ships, they cost several million dollars per year to operate. In view of the deep cuts that have occurred and will continue throughout this decade, saving even a few million dollars can result in reducing some of the fiscal pressure within the Department of the Navy.

The 1990s have compelled the DoN to adopt a *do more with less* mentality to ensure that the goal of maximum readiness is achieved at minimal cost. One solution to this challenge is outsourcing, which is to give a mission, job or asset to another agency that can perform it or manage it more efficiently and less expensively. Transferring the AOEs from the Navy to the NFAF is not outsourcing in the literal sense, since both agencies are part of the Department of the Navy. However, in the context of a military fleet and a civilian fleet, the transfer of the eight AOEs to the NFAF is an attractive outsourcing opportunity.

The six AFSs which were transferred to the NFAF in the early part of the decade are a perfect example of the significant financial savings that can be achieved through AOE transfer. Because of their less expensive civilian crews, today's T-AFSs are cheaper

to operate by more than four million dollars per year for the three older ships, and more than five million dollars per year for the three newer ones.

B. SUMMARIES AND RECOMMENDATIONS

The transfer of the eight Fast Combat Support Ships to the NFAF is a proposal that offers the Department of the Navy an opportunity to save millions of dollars, without sacrificing any of its battle group logistics capability. The financial, and other advantages of this proposal follow.

1. Financial Savings

Using the conversion of the AFSs as a model, the potential savings for the AOEs are even more promising, due to a significantly larger difference in Navy and CIVMAR crew sizes, and the ships longer remaining service lives. After the costs to modify the ships to CIVMAR standards are paid off, T-AOEs could save the DoN $17.5 million per ship, per year, or $140 million class-wide for every year that they remain in service.

a. Recommendation One

In view of the potential for several million dollars in annual savings that can be realized with AOE transfer, it would be prudent for the DoN to transfer the AOEs to the NFAF. Assuming that the rate of inflation will increase annually and because the ships' remaining service life will become shorter each year, it would be prudent for the DoN to begin a transfer program at the soonest opportunity. Otherwise, the potential for savings could be lees than today.

2. Navy Personnel Availabilities

In addition to the civilian crew cost savings, transferring the AOEs, will help the Navy to meet its manpower reduction needs by nearly 200 officers and 4000 enlisted personnel. A second advantage inherent in this availability of personnel is that it will create a resource pool for the Navy to fill shortfalls in critical billets, and augment the Naval Reserve if required.

a. Recommendation Two

The DoN should take further advantage of AOE transfer by using the Navy personnel who are relieved as a resource pool to fill its billet vacancies and augment any other personnel or agency shortfalls.

3. OPTEMPO

A third advantage of transferring the AOEs is that NFAF ships, like all MSC ships have significantly higher OPTEMPOs than Navy ships. In the case of the gulf war, the longest NFAF OPTEMPO was 30% greater than the average for Navy ships. By operating away from homeport for longer periods, less NFAF ships are required to deploy at any given time, resulting in less total operating costs. Also, throughout their impressive OPTEMPOs, NFAF ships historically log an impressive safety record, experiencing considerably fewer incidents than Navy ships at about 20% of the Navy's accident-related costs.

a. Recommendation Three

Putting NFAF ships to sea means that the Navy gets more OPTEMPO from its logistics ships for less cost. The transfer of the eight AOEs would mean that

there are more NFAF ships to put to sea. Thus, the DoN should implement a transfer program now so that it can increase its at sea logistics operations less expensively and safer.

4. Unions

As Federal union employees, the relationship between CIVMARs and the government is not problematic, as private sector labor union and management relationships tend to be. In fact, employee and union relationships within the Federal Government are viewed by Congress as important and beneficial. The costs of CIVMARs' relationships with private sector professional unions are not borne by the government. Finally, only in the case of arbitration, would the government incur a cost, which is usually not significant in amount, nor requires budget augmentation. The affiliation of CIVMARs with both federal and private sector unions is actually beneficial for their morale and professional development.

a. Recommendation Four

The DoN, specifically the MSC, should continue to support CIVMARs' relationship with all of the unions with which they are involved. This will help make the transition of the AOEs to the NFAF easier for CIVMARs.

5. CIVMARs and Combat

Although there has been a recent case of CIVMARs deserting a ship just prior to a deployment to a combat zone, CIVMARs are generally very patriotic. They have logged countless hours at sea during hostilities, from the war in Korea to the war in the Arabian Gulf. They have gone to sea voluntarily during all of these conflicts. They were not

drafted, nor were they compelled by military law to sail with their ships like Navy personnel. Also, the government has been wise to compensate CIVMARs for their service during conflict, albeit retroactively, as a hedge against any potential apathy or reluctance to deploy during future conflicts.

a. Recommendation Five

CIVMARs must be compensated and recognized during and immediately after conflicts just as Navy personnel are. Compensation and recognition programs must be in force now, so that the practice of awarding CIVMARs retroactively for their actions in combat can be avoided. Programs that ensure immediate feedback will be the best means of fostering and maintaining CIVMAR morale.

6. AOE Weapons

Since CIVMARs are noncombatants, T-AOEs, like all former Navy ships in the NFAF, will have to be stripped of their anti-missile systems, tactical acquisition sensors, and electronic warfare systems. This is problematic because armed or not, a logistics ship, especially a station ship, is a high value target to any adversary, since its destruction would cripple a CVBG . With only a minimal small arms allowance for ship security during in-port periods, a NFAF AOE, like all ships in the MSC, will depend completely on CVBG escorts for its defense at sea. This would become a problem when an AOE is required to provide support in different operating areas, forcing the Battle Group Commander to commit a frigate or other combatant to escort the AOE. The result is a sacrifice of the escort's capabilities elsewhere, and a reduction in the Battle Group Commander's span of control. Nonetheless, removing the weapons systems from the AOEs is part and parcel to

the savings that their transfer will create. Otherwise, retaining the weapons would require several officers and enlisted specialists to operate them, thus increasing the size of the MILDET and consequently squandering a large portion of the savings.

a. Recommendation Six

Navy doctrine will have to be revised to account for the battle group's responsibilities regarding defense of an unarmed station ship. Also, pre-deployment training exercises will afford Battle Group Commanders an excellent opportunity to implement, modify and practice the doctrine and tactics required to protect a defenseless AOE. Both of theses ventures must be undertaken as the T-AOEs are introduced to the fleet.

7. Readiness

From the perspective of a Battle Group Commander or other operational commander, transferring the AOEs is apt to create some dissention within the Navy because removing an extremely capable ship like the AOE from the Navy's inventory would be akin to a sacrifice of autonomy and flexibility, as well as the concern that losing its only station ships would result in a degradation of readiness. This view, coupled with this decade's history of deep budget cuts, makes the reluctance by Navy officials to support the transfer of the AOEs understandable.

a. Recommendation Seven

Despite the credibility of these concerns, a significant financial savings is something that today's downsizing Navy cannot afford to ignore. Therefore, the DoN

should approve AOE transfer and operational commanders should take whatever action is necessary to optimize readiness using NFAF-operated AOEs.

C. EPILOGUE

The Department of the Navy fully understands the benefits of operating its logistics ships in the NFAF, as evidenced by the transfer of the AFSs and the current transfer of the AEs. It can only further benefit from transferring the AOEs.

This thesis serves as a preliminary assessment of an AOE transfer program and shows that this proposal has important operational and budgetary advantages. The Navy must continue to put the most combat ready CVBGs to sea in support of the nation's interests. It can do this better and at a lower cost than it ever has by transferring its Fast Combat Support Ships to the NFAF.

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